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VISUAL ASSESSMENT METHODS USED BY DESIGNERS IN INDUSTRY

by: James Henry Birchall

to: Council of National Academic Awards

for: Master of Philosophy

from: Faculty of Art and Design  
Middlesex Polytechnic

date: January 1975

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#### 4. DECLARATION

4.1 For commercial in confidence the identification of the clients referred to in the case studies have been withheld, as well as photographs of the products.

4.2 The case studies are all from the personal files of the author in the capacity of an Industrial Design Consultant. Cases 4, 5, 6, 7, 8, 9, 10, 13, 14, 16, 17, 19 and 20 were carried out while the author was Research Fellow at Hornsey College of Art, later Middlesex Polytechnic. Cases 1, 2, 3, 11, 12, 15 and 18 were carried out within the author's private practice.

In all the cases the author was the principal Industrial Designer involved.

4.3 None of the academic material contained in the thesis has been used before, except as indicated in the formal academic listings (Appendix 12.3).

## 5. SUMMARY

This thesis concerns visual assessment methods that occur in the dealings of the Consultant Industrial Designer with his industrial clients.

The present situation of Industrial Design consultancy in the United Kingdom is outlined in the introduction. This is followed by information on visual assessments. This information is presented from field data in the form of case studies from the personal files of the author. There are twenty case studies from six different companies, all trading in electronic goods. There are thirteen case studies of engineering goods, and seven case studies of consumer goods. In all case studies presented, the author was the principal Industrial Designer involved. In the reporting of the case studies all occasions of visual assessment are prominently noted. Supplementary information is presented from desk data in the form of published works. This data is classified into subjects on designers, the design process and techniques of visualisation, presentation and assessment. This information is analysed into the main constituents that contribute to the visual assessment methods, organised into a simple form and summarised. This summary is then synthesised into a number of models that describe the contributing constituents of visual assessment.

The conclusions are presented as a series of models that describe the visual assessment methods under consideration.

In the appendices are listed the formal academic submissions that supplement this thesis (Figs. 1 and 2).

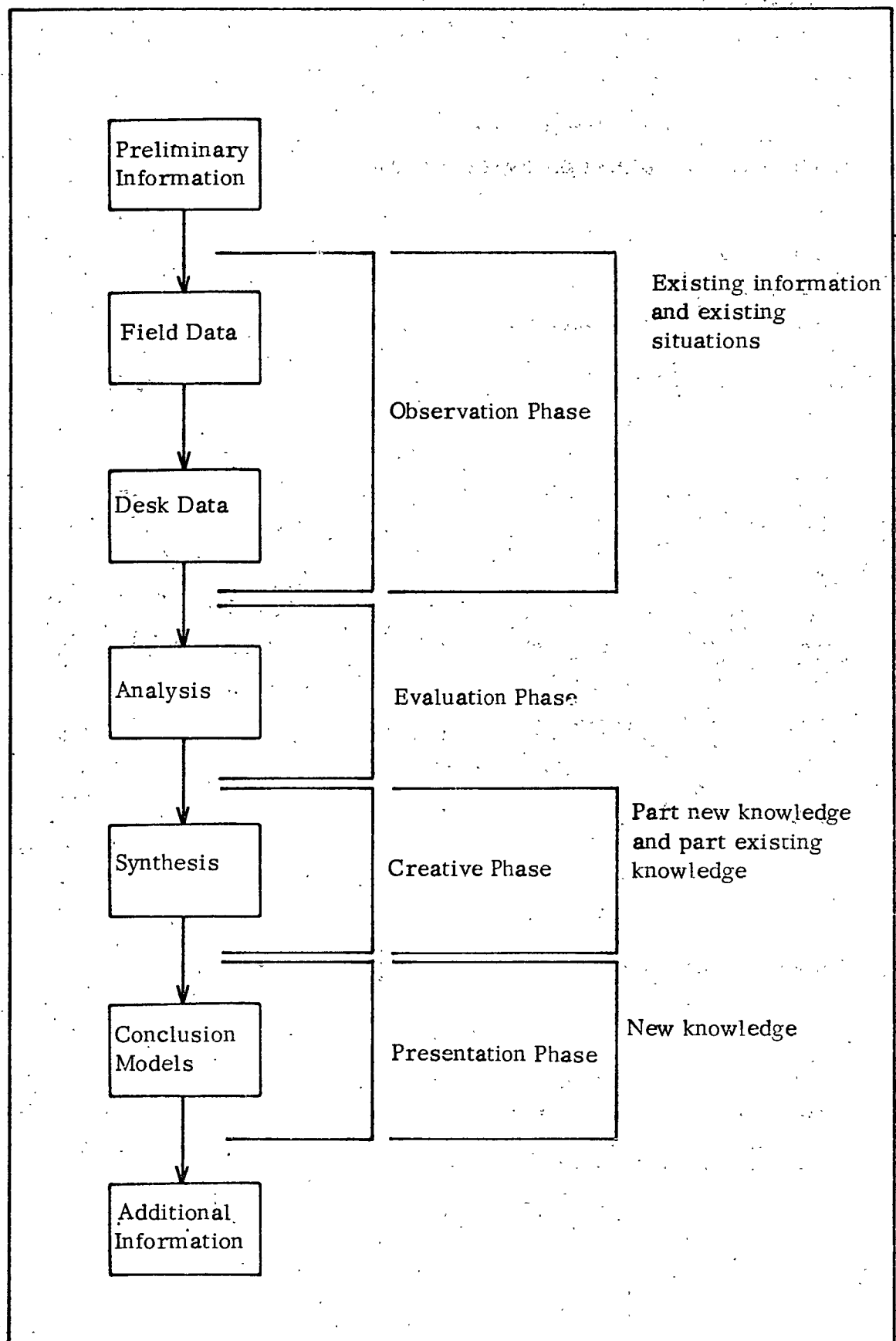


Fig. 1. Block diagram representing the research activities discussed in this report.

## 6. INTRODUCTION

6.1 This thesis concerns visual assessment methods that occur in the dealings of the Consultant Industrial Designer with his industrial clients.

The objectives of the research were:

1. To examine the activity of a Consultant Industrial Designer in his dealings with Industry through a case study investigation.
2. To record the occasions and conditions when visual assessments take place.
3. To correlate this information, supplemented by desk data from published sources, and to establish patterns of activity.
4. To set out a model for the visual assessments as stated.

6.2 Information for this report has been collected through field research in the form of case studies, supplemented by desk research from published sources. Field data may be collected by one, or a combination of three methods, observation, experimentation and sample survey (Ref. 1).

The author has used the observation approach in the form of case studies where he was the principal consultant industrial designer involved. For precedence in this approach to academic design research, attention is drawn to the work of Hykin (Ref. 2).

6.3 Before this research commenced the author was already a practising Industrial Design consultant. At this time he became aware of the critical nature of the client visual assessment stage in the design consultancy process, and the lack of objective information available on the subject. He decided therefore to collect case study information in the hope that it would lead to an understanding of the nature of the client visual assessment stage. At the commencement he expected the trend in data analysis to eventually show a move towards determining several methods of visual choosing that could be used by the designer and client. However, data eventually showed that other factors, and other visual assessments had equal significance.

When field work was started the author had very little guidance on procedures to be adopted when seeking case study data. Although some case histories had been used to promote Industrial Design activity most of them had been recorded retrospectively and were superficial. In the absence of any useful precedent the author decided to keep detailed project files on all the case studies and abstract the relevant information at a later date.

The author gradually became aware that there was a body of information that he would be unable to obtain from the client. This information was either on company policy or the client's personality and position within the company. When attempts were made to solicit this information they were met with indifference, hostility or ridicule.

During the academic course work for this project the author was introduced to the work of Baker (Ref. 1) and Hykin (Ref. 2) on field data and case studies respectively. These proved to be of great support to the project.

On analysing the detailed project files, information on financing and design methods was omitted. The author recognises that project financing and project design methods are both crucial to project success and are fascinating research projects in their own right. However, they are outside the scope of this research project.

The final sifting of field data commenced by identifying the visual stages within each design process and constructing the chronology of the process around them. These stages were then used as the basis of the detailed analysis. The desk data was analysed in a similar manner. This analysed data was summarised and used as a basis for synthesising the constituents of visual assessments. In a similar manner the synthesised data is summarised and used as a basis for the Conclusions.

Finally, conclusions are presented as a series of models which describe the visual assessment methods under consideration (Figs. 1 and 2).

6.4 Industrial Design in the United Kingdom is usually

taught at colleges of art and design and at polytechnics. The Society of Industrial Artists and Designers is the professional body for Industrial Designers. The Design Council is the national promotional body, with the International Council of Societies of Industrial Design being the international promotional body.

As a Consultant Industrial Designer the author currently believes that Industrial Design is designing products for industrial production, which in practice usually means adding appeal to the product. This appeal is in the main, visual appeal, and in the minor, workability, usability and cost appeal. The author acknowledges that workability appeal is within the practice of engineering design, usability appeal is within the practice of ergonomics and cost appeal within the practice of value engineering (Fig. 3).

The author has found that 'The Usual Service and Methods of Charging for Product Design' (Ref. 3) published by the S.I.A.D. serves as a useful introduction to the theory of product industrial design consultancy. The publication states that the usual services provided by the consultant product Industrial Designer are:-

#### 1. Briefing

The designer will first obtain from the client a full briefing on the design required, the market for which it is intended, and the desired selling price and/or manufacturing cost. He may, on occasion, be asked to prepare his own brief from information the client gives him. He will make himself conversant with the client's manufacturing facilities. The commission and brief must be confirmed in writing before proceeding. If the brief specifies a number of alternative designs for the client's choice the designer is entitled to charge a proportionally higher fee.

#### 2. Report

The designer may be asked to prepare a report(s), either before a design programme has been commissioned or at any

stage during the design programme. The commission for a report must be confirmed in writing before proceeding.

### 3. Programme

The design project can normally be considered in stages with a proportion of the fees to be agreed in advance payable on completion of each stage.

### 4. Stage A

Design Proposals: The designer submits his design proposals in model and/or drawing form to the client for approval.

### 5. Stage B

Modification and Development of Design Proposals: The extent of this work will depend upon the complexity of the design in question. The designer works in close conjunction with the client's production or development staff to achieve a satisfactory final form.

### 6. Stage C

Drawings: The designer is responsible for ensuring that development drawings are prepared with such full size details and specifications as may be necessary to ensure the proper interpretation of his intentions. He may work with the client's draughting office or he may detail the work in his own office.

### 7. Stage D

Prototypes: The designer will advise on or participate in the manufacture of prototypes as agreed with the client beforehand. A record should be kept of all modifications made or suggested during this work and copies retained by both parties.

### 8. Stage E

First Production Batch: The designer should check and approve the client production detail drawings for correct interpretation and specification of his requirements, but unless specially agreed will not be responsible for detailed dimensional and specification checking. The designer is available for advice during production of the first batch and should be consulted on any modifications that might prove advisable.

### 9. Modifications

The client may not make modifications or alterations to the

designs without the consent of the designer (Fig. 5).

In 1968 the Council of the SIAD appointed a Commission on Professionalism.

Their report (Ref. 4) evidenced grass root opinions on the practice of Industrial Design from members and Industry.

6.5 The foregoing paragraphs set the scene on bases for visual assessment methods which may be used by designers in Industry. The subsequent report states the findings of the author on visual assessment methods used by designers in Industry.



Fig. 2. Bar chart of the research activities discussed in this report.

	71	72	73	74	75
	S.	O.	N.	D.	J.
Field Data		20 Case Studies			
Desk Data		Literature search		Literature search	
Courses Taken			Engineering Design Management for Designers Design Management Colour Science		
Papers Published			Industrial Design of Public Address Equipment IPAE Industrial Designers-who and what we are IED Colour for Engineering Designers IED		
Documentation			First draft	Second draft Final draft	
Assessment			Preliminary assessment / Final assessment		
Presentation					

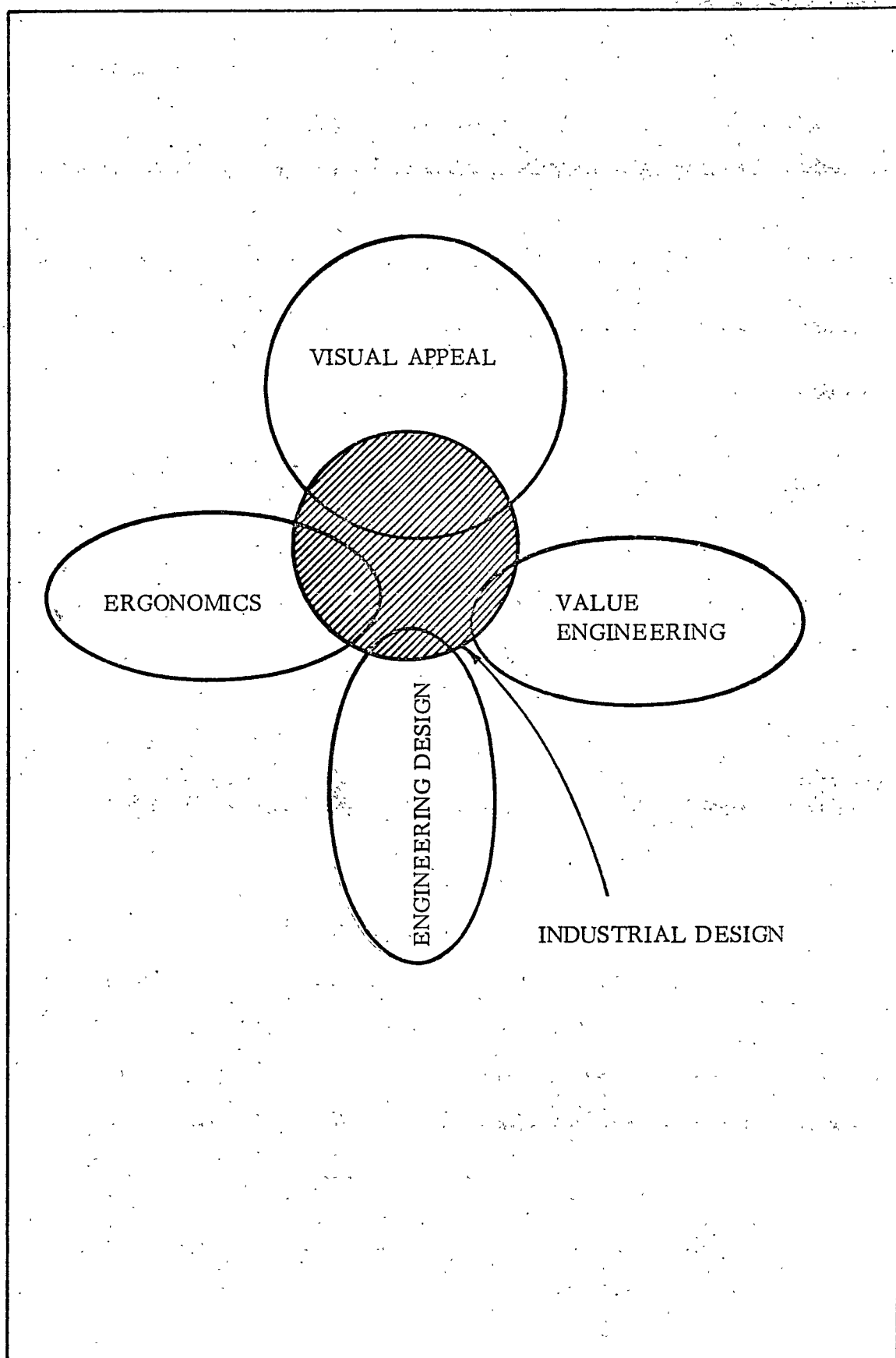


Fig. 3. Diagram illustrating the appeal aspects of Industrial Design

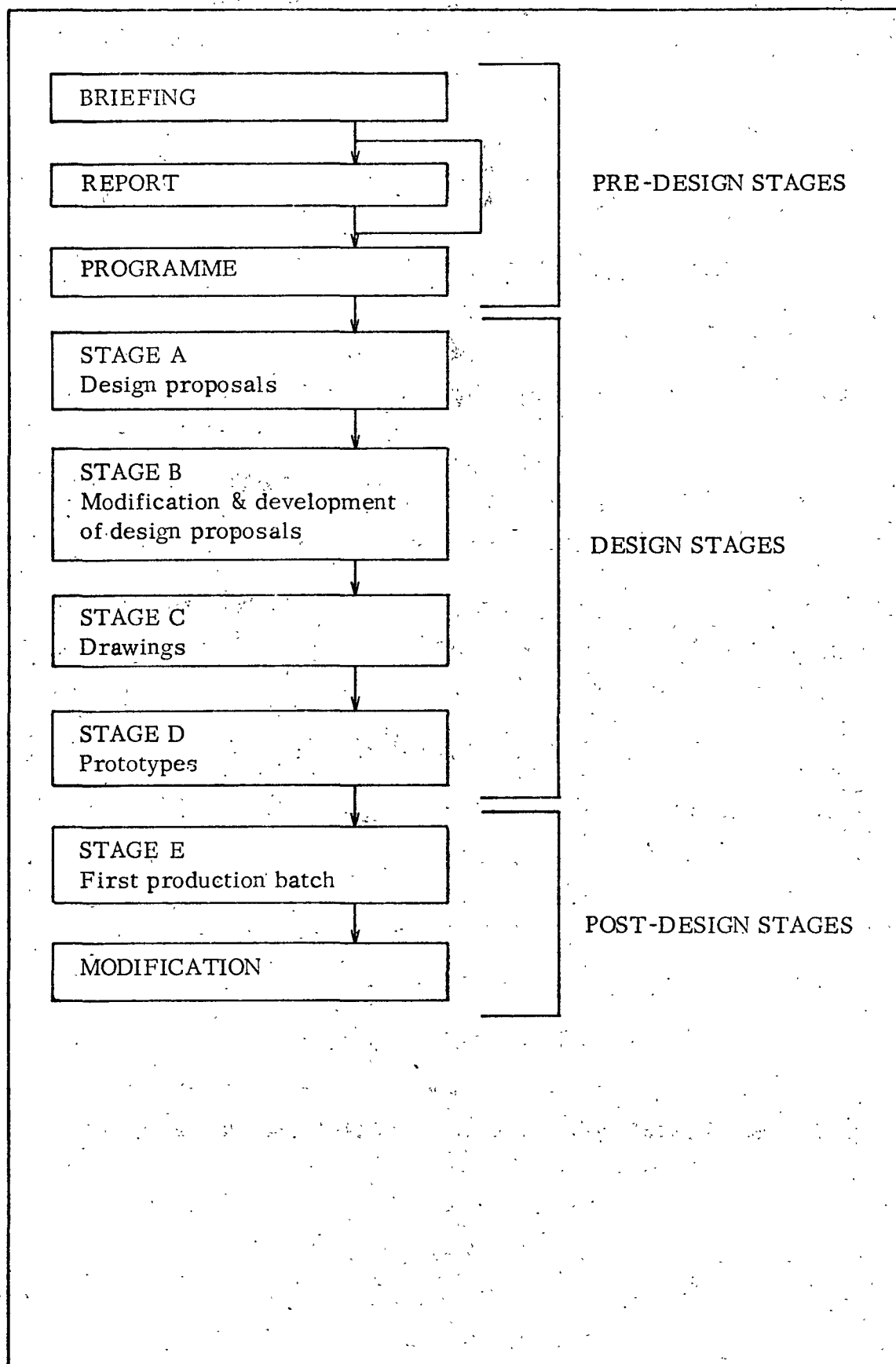


Fig. 4. A design process diagram based on the publication 'The Usual Service and Methods of Charging for Product Design' (Ref. 3)

## 7. FIELD DATA

This <sup>is</sup> field data ~~is~~ presented as case study reports from the personal files of the author in the capacity of an Industrial Design Consultant. The cases are presented as a series of chronological events in which the visual assessments are catalogued. Extraneous information has been omitted, and commercial in confidence information has been removed. The remaining information is used to narrate the events around the visual assessments. The cases are titled by an alphabet designation for the name of the company, together with the type of product.

## 7.1 Company A : Product Freezers

Background: the Company was considering re-styling and marketing an existing imported range of freezers. The Industrial Designer was already acting as a consultant to the Company.

### 7.1.1 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/TVs

Appliance Manager

Appliance Manager's Assistant/Product Planning

Room:- Large conference/display room, overhead windows only, permanent artificial supplementary lighting.

The existing range of freezers was presented and various appearance aspects discussed. It was decided that the production terms of reference allowed for possible changes in colour and trim styling. The Industrial Designer was asked to prepare a range of colour and trim styling schemes; a further meeting was called for four weeks' later.

#### VISUAL ASSESSMENT 1.1

by: Industrial Designer + 5 marketing men

in: Company conference room

method: Subjective appraisal with verbal comments

of: Existing range of products

7.1.2 Design studio: the Designer tentatively selected a range of colours from the British Standard and Company colour ranges. A presentation diagram was drawn up.

### VISUAL ASSESSMENT 1.2

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Colour cards

Over a period of two weeks and through a prolonged period of colour card shuffling twelve colour schemes were decided upon.

These colour schemes were mounted on a display sheet.

### VISUAL ASSESSMENT 1.3

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Colour cards

7.1.3 Company location meeting: people present, as previous meeting.

Room:- Small Product Planning Manager's office, high side window only, permanent artificial supplementary lighting. The three sheets of twelve schemes were pinned to one wall. There was no immediate response from those present. This was verbally noted by the Product Planning Manager.

It was generally decided that none of the presented colour schemes were visually exciting but it was admitted that the meeting was judging small colour cards and the intended coloured product was much larger. The Designer solicited a target range of colours from those present and it was decided that the Designer would present a smaller number of colour schemes but on much larger displays. The Designer considered the meeting to be a flop and his colours to be too timid.

#### VISUAL ASSESSMENT 1.4

by: Industrial Designer + 5 marketing men  
in: Company office  
method: Subjective appearance with verbal comments  
of: Displayed colour cards

7.1.4 Design studio: still using the BS colour card but with the addition of an ICI car colour pack a target range of colour schemes was decided upon. These were made up on large sheets of card.

#### VISUAL ASSESSMENT 1.5

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Colour cards

7.1.5 Company location meeting: people present, as previous meeting.

Room:- Product Planning Manager's small office.

The four colour scheme sheets were pinned to one wall, again, there was no immediate response from those present. It was decided to make no decision on colour schemes at this point but that the Appliance Manager would consider and make a decision later.

#### VISUAL ASSESSMENT 1.6

by: Industrial Designer + 5 marketing men  
in: Company office  
method: Subjective appraisal with verbal comments  
of: Displayed colour schemes

7.1.6 Meeting at the Appliance Division

People present:-

Industrial Designer

Industrial Designer's Associate

Appliance Manager

Appliance Manager's Assistant/Product Planning

Room:- Appliance Manager's office

The Appliance Manager described to the designer the critical position the project was in now, in that in eight days' time a meeting was to be held in Norway to discuss future product planning and styling on freezers. Therefore a fully styled up model of a freezer had to be built, assessed by the Appliance Manager and transported to Norway for the meeting. The last four colour schemes were brought out and shuffled about the floor and wall. The Appliance Manager then decided on one of the schemes. The re-styling of the trim was left to the Designer with instructions that no control components were to be altered. It was agreed that the Designer could cannibalise a brand new existing freezer and that in six days' time the re-styled freezer would be assembled in the Appliance Division, assessed by the Manager and shipped that night to Norway with the Appliance Manager as "Fragile: Excess Baggage".

#### VISUAL ASSESSMENT 1.7

by: Industrial Designer + associate + 2 marketing men

in: Company office

method: Subjective appraisal with verbal comments

of: Displayed colour schemes

7.1.7 Design studio: the work-load was divided into two main areas, the re-colouring of the freezer and the re-styling of the trim. It was decided that in view of the short time period only one design solution to the re-styling of the trim was to be considered and implemented. Without prior assembly and assessment all the bits and pieces were delivered by the Designer to the Appliance Division.

7.1.8 Meeting at the Appliance Division: same as previous company meeting.



The Industrial Designer and the Appliance Manager's Assistant/Product Planning assembled the freezer. As the assembly was completed the Appliance Manager came in to look at the freezer. The Appliance Manager was immediately impressed visually and decided that the styling and colour scheme were correct and impressive. He said that this response was totally subjective and a "good gut feeling", he immediately ordered the freezer to be disassembled and packed in expanded polystyrene for delivery to Norway. The Designer then presented the written specification for the schemes and the meeting was ended.

**VISUAL ASSESSMENT 1.8**

by: Industrial Designer + 2 marketing men

in: Company office

method: Subjective appraisal with verbal comments

of: Prototype appearance model

7.1.9 Note: It was later reported back to the Designer that the meeting in Norway was a huge success largely attributed to the presentation of a fully-styled and coloured-up freezer.

**VISUAL ASSESSMENT 1.9**

by: Company personnel

in: Company location

method: Not known

of: Prototype appearance model and possibly other designs

## 7.2 Company A : Product Blenders

Background: the Company was considering marketing a modified imported blender. The Industrial Designer was already acting as a consultant to the Company.

7.2.1 A meeting was held at the Company location to discuss an imported blender.

People present:-

Industrial Designer

Product Planning Manager

Appliance Manager

Appliance Manager's Assistant/Product Planning

Room:- Product Planning Manager's small office, high side windows only, permanent artificial supplementary lighting.

The existing imported blender was presented, a re-styled version of the blender was also presented and the marketing plan for the blenders was discussed. Essentially, this plan stated that the existing imported blender was not to be sold in this country, that the re-styled version was to be marketed now for High Street sale the following year and that product planning wished to consider the next generation of blenders. The Designer was asked to keep the same blender motor and jar capacity but to upgrade the appearance in terms of shape, colour, graphics and control.

### VISUAL ASSESSMENT 2.1

by: Industrial Designer + 3 marketing men

in: Company location

method: Subjective appraisal with verbal directions

of: Existing range of company products

7.2.2 Design studio: the Designer drew up a matrix of appearance, shape, colour, graphics and controls.

The Designer also decided to present this information in terms of block models. Specifications for full block models were subjectively selected from the matrix, and constructed.

### VISUAL ASSESSMENT 2.2

by: Industrial Designer only  
in: Design studio  
method: Subjective appraisal  
of: Design options on a diagram

7.2.3 Company location meeting: as previous meeting.

Unfortunately, the Appliance Manager and his assistant were suddenly called to another meeting at a different location so the models were re-packed and taken with them on the understanding that they would consider the models and make a decision later.

7.2.4 Meeting at the Appliance Division

People present:-

Industrial Designer

Appliance Manager

Appliance Manager's Assistant/Product Planning

Room:- The Appliance Manager's office with good window lighting.

The Appliance Manager had decided that he wished to upgrade the product to new specifications, that the colour scheme should relate to the freezer colour scheme, that overall visually the body size had to be reduced in relation to the jar size being increased and the control function to be more visually obvious.

### VISUAL ASSESSMENT 2.3

by: Industrial Designer + 2 marketing men  
in: Company office  
method: Subjective appraisal with verbal directions  
of: Coloured full size block models

7.2.5 Design studio: a new design matrix was drawn up and a number of cardboard appearance models constructed.

#### VISUAL ASSESSMENT 2.4

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Cardboard appearance models

#### 7.2.6 Meeting at the Appliance Division

People present:-

Industrial Designer

Appliance Manager's Assistant/Product Planning

Room:- Appliance Manager's Assistant's office.

The Appliance Manager's Assistant considered the objects and requested a number of alterations and a meeting was called for the following week.

#### VISUAL ASSESSMENT 2.5

by: Industrial Designer + 1 marketing man

in: Company office

method: Subjective appraisal with verbal directions

of: Cardboard appearance models

7.2.7 Design studio: all the alterations suggested by the Appliance Manager's Assistant were drawn up and two more cardboard models constructed.

#### 7.2.8 Company location meeting: at the Appliance Division

People present:-

Industrial Designer

Appliance Manager

Appliance Manager's Assistant/Product Planning

Sales Manager

Room:- The Appliance Manager's office

All models were considered and only one set of specifications chosen. The Designer was asked to prepare a better model to the new specifications with a back-up written specification.

VISUAL ASSESSMENT 2.6

by: Industrial Designer + 3 marketing men  
in: Company office  
method: Subjective appraisal with verbal directions  
of: Cardboard appearance models

7.2.9 Design studio: a design drawing for the new model was issued to a Modelmaker; a written specification was drawn up and a simple market comparison table was written up also. The model was collected from the Modelmaker and assessed visually in the design studio.

VISUAL ASSESSMENT 2.7

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: A finished appearance model

7.2.10 Meeting at the Appliance Division; same as previous meeting.

The design for the blender was subjectively judged to be successful and saleable. The Appliance Manager said that his gut feeling for the product was good. The rest of the meeting deteriorated into discussion of how the product was going to be marketed.

VISUAL ASSESSMENT 2.8

by: Industrial Designer + 3 marketing men  
in: Company office  
method: Subjective appraisal with verbal comments  
of: A finished appearance model

7.2.11 Note: The Designer was informed later that the model and the specification were being taken to the original blender manufacturing company on the Continent.

### 7.3 Company A : Product TVs

Background: the Company was considering the design for the next generation of TVs. The Industrial Designer was already acting as a consultant to the Company.

#### 7.3.1 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Production Planning Manager's Assistant/TVs

Room:- Product Planning Manager's small office.

The existing range of portable TVs and the specification for the new range was explained to the Designer.

A styling range was described also to the Designer in terms of selected examples from existing European TV manufacturers' coloured brochures. The Designer was asked to present a selection of drawings.

#### VISUAL ASSESSMENT 3.1

by: Industrial Designer + 2 marketing men

in: Company office

method: Subjective appraisal with verbal directions

of: Existing products, manufacturers' brochures and product planning charts

7.3.2 Design studio: a number of loose tentative design matrices were drawn up.

#### VISUAL ASSESSMENT 3.2

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design matrices drawings

From these matrices twelve appearance drawings constructed and mounted in display folders.

#### VISUAL ASSESSMENT 3.3

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: 12 appearance drawings

7.3.3 Company location meeting: same as previous meeting. All twelve drawings were pinned to one wall and the Designer asked to explain them. The Marketing Manager was called into the meeting and the Designer was asked again to explain the drawings to him. The verbal comments and opinions of the Marketing Manager were noted. The UK Sales Manager was called then into the meeting. The Designer was requested to explain the drawings to him. His comments and opinions were noted also. The Marketing Manager and the UK Sales Manager then left the meeting. The Designer and the Product Planning Manager took then a consensus of opinions. The Designer was asked to construct cardboard models to meet the "consensus of opinion specifications".

#### VISUAL ASSESSMENT 3.4

by: Industrial Designer + 2-4 marketing men  
in: Company office  
method: Subjective appraisal based on a consensus of verbal opinions  
of: 12 appearance drawings

7.3.4 Design studio: a new set of specifications and matrices was constructed by the Designer. Using a selection from these the Designer constructed three cardboard models.

### VISUAL ASSESSMENT 3.5

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Design drawings

### VISUAL ASSESSMENT 3.6

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: 3 cardboard models

#### 7.3.5 Company location meeting

People present:-

Industrial Designer

Production Planning Manager's Assistant/TVs

Product Co-ordinator

Divisional Engineer

Project Engineer

Room:- Large conference/display room, overhead windows only, permanent artificial supplementary lighting.

The Divisional Industrial Designer presented the engineering specifications for the product and the Project Engineer presented CR tube with an associated cardboard model of components. It was obvious immediately that the marketing specifications had understated the size and weight of the product, also, control and ventilation positions as derived from the marketing specifications presented considerable problems in relation to heat dissipation. The Product Planning Manager's Assistant/TVs also re-specified aspects of the marketing requirement. The Designer was asked to reconstruct the cardboard models.



#### VISUAL ASSESSMENT 3.7

by: Industrial Designer + 2 engineers + 2 marketing men  
in: Company location  
method: Subjective appraisal with verbal discussions  
of: 4 cardboard models

7.3.6 Design studio: a new set of specifications and matrices was drawn up by the Designer, two cardboard models were constructed but it was decided by the Designer only to present one.

#### VISUAL ASSESSMENT 3.8

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Design drawings

#### VISUAL ASSESSMENT 3.9

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: 2 cardboard models

#### 7.3.7 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/TVs

Room:- Product Planning Manager's small office

The cardboard model was presented. The Product Planning Manager said that the design appealed to him immediately; he was very pleased with it and questioned the design on detailed points. It was decided to send the model down to Engineering Production for design detailing.

VISUAL ASSESSMENT 3.10

by: Industrial Designer + 2 marketing men

in: Company office

method: Subjective appraisal with verbal comments

of: A cardboard model

## 7.4 Company B : Product Modular Amplifier

Background: previous to the Designer's involvement, a design proposal had been submitted to the client and lost in the Company. On taking charge of the project the Designer noted that a proper colour survey had not been carried out for the client so the Designer made arrangements for the survey.

### 7.4.1 Design Studio

People present:-

Industrial Designer

Industrial Designer's Associate

The client had already accepted a tonal colour arrangement for the casing of the amplifier and the Designers discussed arrangements for translating this tonal arrangement into a colour arrangement. Four pairs of colours were chosen from a collection of colour cards.

#### VISUAL ASSESSMENT 4.1

by: Industrial Designer + 1 associate

in: Design studio

method: Subjective appraisal with verbal discussions

of: A selection of colour cards

Models were constructed of the casing with interchangeable tops and fronts giving sixteen permutations. The finished models were left lying around the studio for a number of days. Although several people gave verbal preferences on the coloured models, the Designer allowed no firm decision to be made. A telephone call was made to the client (Chief Draughtsman) who agreed to accept the coloured models and consider them. Arrangements were made for the models to be delivered.

#### VISUAL ASSESSMENT 4.2

by: Design studio personnel

in: Design studio

method: Subjective appraisal with verbal discussions

of: 16 colour permutation models

7.4.2 Company location: the Designer was casually visiting the Company to pick up some test gear when he was invited into the Product Planning Manager's office.

People present:-

Industrial Designer

Industrial Designer's Associate

Product Planning Manager

Chief Draughtsman

Project Engineer, Mechanical

Room:- Product Planning Manager's small office in prefabricated wooden structure, one desk, several chairs, large side windows.

The Chief Draughtsman presented the proposed pre-production model. The Designer informed the Product Planning Manager that the proposed design was unsatisfactory and rather than make on-the-spot criticisms, he offered to take their model off site and re-style it. The Product Planning Manager agreed to this but stressed the urgency of proposing a design freeze. The Designers said that they appreciated this, and would give full attention to the job. Before leaving with the model the Product Planning Manager confided to the Designers that Marketing also considered the pre-production design as unsatisfactory but needed external Industrial Design expertise to convince the engineering function of this.

#### VISUAL ASSESSMENT 4.3

by: Industrial Designer + 1 associate + 2 engineers  
+ 1 marketing man  
in: Company office  
method: Subjective appraisal  
of: Pre-production model

7.4.3 Design Studio: the Designer arranged for a design work-in to analyse the model and make fresh proposals.

People present:-

Industrial Designer

3 Industrial Associates

Company Industrial Design Co-ordinator

Room:- Large design conference room, white painted. Side windows on opposite walls.

The Company's model was analysed and fresh design proposals considered. Several alternative proposals were considered but the Industrial Designer made the decision on which proposals were to be implemented. The Designer also made arrangements for the Company model to be rebuilt to the new design specifications. He also made arrangements for a number of alternative design solutions to be written up as an appendix to the report on the proposed new design.

#### VISUAL ASSESSMENT 4.4

by: Industrial Designer + 3 associates + 1 company manager  
in: Design studio  
method: Subjective appraisal with verbal comments  
of: Pre-production model

Implementation of this took two weeks and at the end of this time the finished new model was kept in the Design Office.

#### VISUAL ASSESSMENT 4.5

by: Design office personnel

in: Design studio

method: Subjective appraisal with verbal comments

of: An appearance model

#### 7.4.4 Meeting at Company location

People present:-

Industrial Designer

3 Industrial Design Associates

Company Industrial Design Co-ordinator

Chief Engineer

Chief Draughtsman

Project Engineer, Mechanical

Project Engineer, Electrical

Product Planning Manager

Two Marketing personnel

Room:- Large conference room in the same wooden prefabricated structure with a large conference table and seats, side windows only.

The new appearance model was presented by the design team and reviewed verbally. The Company representatives agreed unanimously that the product was far more exciting visually than the previous "monstrosity" and was saleable. Detailed discussion followed on the implementation of the design proposals. At this point in the meeting the two Project Engineers began describing a new mechanical system of construction that was considerably simpler and cheaper.

The Chief Engineer wanted to know in great detail why the new appearance model was so exciting and the Designer with great difficulty tried to explain to him. The Chief Engineer decreed that the Industrial Designer should work in parallel with his engineers on the new design construction. The Designers accepted chassis construction to work on, agreeing that they would try to make a new construction as visually pleasant as their previous design proposal.

#### VISUAL ASSESSMENT 4.6

by: Industrial Designer + 3 associates + 1 manager + 4 engineers + 3 marketing men  
in: Company conference room  
method: Subjective appraisal with verbal comments  
of: An appearance model + new constructional model

7.4.5 Design studio: at the design studio the Designers examined the project to date and made an appraisal of the current situation. The Designer listed all the new design decisions that had to be taken and made proposals for presenting these decisions to the client. Two structural models were made showing major proposals and detailed solutions to various design problems. The Designer telephoned the Chief Draughtsman and a meeting at the Company location was set up.

#### VISUAL ASSESSMENT 4.7

by: Design studio personnel  
in: Design studio  
method: Subjective appraisal with verbal comments  
of: 2 structural models

#### 7.4.6 Company location meeting

People present:-

Industrial Designer

3 Industrial Design Associates

Chief Draughtsman

Project Engineer, Mechanical

Project Engineer, Electrical

Room:- Foyer on a large wooden structure which displayed examples of the Company's present range of equipment. Side windows only.

The Designer outlined the problems with which they were faced and showed the two models. The Chief Draughtsman detailed some of the new development to date and agreed

to take notice of some of the Industrial Design proposals, and the meeting broke up.

Note: The Designer considered the meeting to be unsatisfactory.

#### VISUAL ASSESSMENT 4.8

by: Industrial Designer + 3 associates + 3 engineers

in: Company foyer room

method: Subjective appraisal with verbal discussions

of: 2 structural models

After the meeting the Chief Draughtsman said they had carried out an on-site survey of the coloured models and after much searching through his project file he eventually gave the Designers a copy of the results. The results of the survey had indicated that the colours at present being considered for the model were those most favoured in the survey.

#### VISUAL ASSESSMENT 4.9

by: Company engineers

in: Company location

method: Subjective appraisal survey

of: 16 colour permutations models

7.4.7 Design studio: the Designers again re-assessed the situation and the major difficulties with which they were faced. This hinged upon a constructional problem. Several alternative methods were considered and a structural model was designed and built incorporating some of these proposals. A meeting with the Chief Draughtsman was arranged by telephone at the Company location.



VISUAL ASSESSMENT 4.10

by: Design studio personnel  
in: Design studio  
method: Subjective appraisal  
of: A structural model

7.4.8 Company location meeting: as previous Company meeting.

The alternative construction methods were demonstrated to the Chief Draughtsman and the engineering production difficulties discussed. The Chief Draughtsman agreed to take notice of the new proposals and the meeting broke up.

VISUAL ASSESSMENT 4.11

by: Industrial Designer + 3 associates + 3 engineers  
in: Company location  
method: Subjective appraisal with verbal discussions  
of: A structural model

A Company Industrial Design Seminar was being organised and the Product Planning Manager had agreed to bring along the new production model and give a paper on the case history of the project.

7.4.9 Design Seminar: location, Nash House

Room:- Very large ground floor conference room with large side windows.

Before the commencement of the Seminar the Industrial Designer and the Product Planning Manager examined the pre-production model and agreed that it was satisfactory. The Designer did notice a number of design details that he would have liked to have changed but decided to make no comment as the design freeze had been initiated and the design changes could have been considered as alternatives rather than improvements.

VISUAL ASSESSMENT 4.12

by: Industrial Designer + 1 marketing man

in: Hired conference room

method: Subjective appraisal with verbal discussions

of: Pre-production model

7.4.10 The following month the design was participating in a colour science and computing course and had the opportunity to carry out some objective assessments of the colours used, or nearly used, on the product.

The results of this objective assessment were not passed on to the client.

VISUAL ASSESSMENT 4.13

by: Industrial Designer

in: Colour science laboratory

method: Objective assessment

of: Colour samples

## 7.5 Company C : Product High Frequency Amplifier

Background: the Company was considering the visual upgrading of an existing high frequency amplifier at no extra production cost. The design team was already in informal contact with the Company.

### 7.5.1 Company location meeting

People present:-

Industrial Designer

2 Industrial Design Associates

Chief Engineer

Senior Engineer, Mechanical Design

Senior Engineer, Electrical Design

Engineer, Mechanical Design

Room:- Large conference room, side windows, permanent artificial supplementary lighting.

The existing High Frequency Amplifier was presented and discussed. The production method was detailed and the number of components that were not critical to being changed also listed. The Designers were supplied with components for the construction of two amplifier cases.

#### VISUAL ASSESSMENT 5.1

by: Industrial Designer +2 associates + 4 engineers

in: Company conference room

method: Subjective appraisal with verbal discussions

of: An existing company product

7.5.2 Design studio: after due discussion in the design studio specifications for two models were selected. It was decided to reconstruct the two cases to these specifications. The two models were constructed, and the Chief Engineer was invited to the design studio to inspect the models.

VISUAL ASSESSMENT 5.2

by: Industrial Designer + associates

in: Design studio

method: Subjective appraisal with verbal discussions

of: 2 appearance models

7.5.3 Design studio: the Chief Engineer came and inspected the models and found them interesting visually but was uncertain about the implementation of the proposed changes. Some time later the Designer was requested to have the two models delivered to the Company; this was carried out.

VISUAL ASSESSMENT 5.3

by: Industrial Designer + 1 engineer

in: Design studio

method: Subjective appraisal with verbal discussions

of: 2 appearance models

7.5.4 No further action has been taken on the project.

## 7.6 Company C : Product Telephone Linesman's Box

Background: the Company wished to have illustrated how an existing product could have had greater visual impact if Industrial Designers had been called in at an earlier stage of the product development. The Industrial Design team had been previously employed by the Company.

### 7.6.1 Company location meeting

People present:-

Industrial Designer

Two Industrial Design Associates

Chief Engineer

Senior Engineer, Mechanical Design

Engineer, Mechanical Design

Senior Engineer, Electrical Design

Engineer, Electrical Design

Room:- Large conference room, side windows, permanent artificial supplementary lighting.

The existing telephone linesman's box was presented and discussed. It was stated that the major customer for this product held rigid control of equipment practices. The Designers were asked to re-style the product to meet customer requirements and an alternative to meet Company requirements. The Designers were given drawings and specifications for the existing telephone linesman's box.

#### VISUAL ASSESSMENT 6.1

by: Industrial Designer + 2 associates + 5 engineers

in: Company conference room

method: Subjective appraisal with verbal discussions

of: An existing company product

7.6.2 Design Studio: after due discussion in the design studio a number of variables were isolated and alternative design solutions constructed for these variables.

## VISUAL ASSESSMENT 6.2

by: Industrial Designer + associates

in: Design studio

method: Subjective appraisal with verbal discussion

of: An existing product and design sketches

Two models were constructed, one to meet customer requirements the other to meet Company requirements.

7.6.3 Company location meeting: same as previous Company meeting.

The Senior Mechanical Engineer presented the latest version by the Company of the telephone linesman's box. The Designer, after telling the story of the industrial design development presented both models of their telephone linesman's box. It was unanimously agreed by the meeting that the two industrially designed models were visually more impressive and graphically more intelligible than the Company product, and that in future, the Chief Engineer would consider calling in industrial design expertise at the start of new product development. It was decided also at that stage that it would be too difficult to implement any of the proposed industrial design recommendations. The two models were returned to the design studio and the Company showed little further interest in them.

## VISUAL ASSESSMENT 6.3

by: Industrial Designer + 2 associates + 5 engineers

in: Company conference room

method: Subjective appraisal with verbal discussions

of: 3 appearance models

## 7.7 Company D : Product Power Supply

Background: the Industrial Designer had been acquainted with the existing product for some time and had been commenting upon the fact that the labelling on the product was not to Company graphic standards, badly laid out, and lacked visual impact. The Designer had been requested by the Division Manager to arrange a meeting with the Chief Engineer in charge of the product to discuss the label.

### 7.7.1 Meeting at Company Location

People present:-

Industrial Designer

Industrial Designer's Assistant

Chief Engineer

Room:- Chief Engineer's office, side windows, badly cluttered desk and filing cabinets.

The Chief Engineer was very belligerent about any "artist" telling him that the design of his product was inadequate and requested the Designer to show him what was wrong and if anything was wrong, to try and put it right.

7.7.2 Design Studio: a photographic enlargement was made of the product and analysed. A matrix was constructed of alternative schemes that were adequate and visually more pleasing. These were laid out on a large sheet in such a manner that closely simulated the existing product.

#### VISUAL ASSESSMENT 7.1

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: A photo analysis of the existing product, and a sheet of design proposals

7.7.3 Meeting at Company location: circumstances the same as for previous meeting.

The photographic enlargement of the existing product was

presented to the Chief Engineer and the deficiencies discussed. Then the sheet of alternative design solutions was presented, the Chief Engineer was impressed visually with the analysis and work done by the Designer and called in the Division Manager to the meeting. Then the Designer explained all again to the Division Manager, who was also visually impressed. The Division Manager called in then the Marketing Manager, Publicity Manager and Project Engineer. Again the Designer explained everything to those present. The Division Manager and the Chief Engineer decided the aspects of the alternative design solutions that they required and the Designer was asked to make up a dummy product for those requirements.

#### VISUAL ASSESSMENTS 7.2

by: Industrial Designer + 1 assistant + 2 engineers  
+ 2 marketing men + 1 manager

in: Company office

method: Subjective appraisal with verbal comments

of: A photo analysis of the existing product, and a sheet of design proposals

7.7.4 Design Studio: the Company specified requirements were assimilated by the Designer and a number of design solutions constructed. One of the design solutions was chosen then by the Designer and used to construct a dummy product.

#### VISUAL ASSESSMENT 7.3

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: A dummy product

#### 7.7.5 Meeting at Company location

People present:-



Industrial Designer

Chief Engineer

Project Engineer

Room:- Chief Engineer's office.

The dummy product was presented by the Designer, both the Chief Engineer and the Project Engineer examined the dummy carefully and made a number of minor criticisms. The Designer was asked to remake the dummy.

**VISUAL ASSESSMENT 7.4**

by: Industrial Designer + 2 engineers

in: Company office

method: Subjective appraisal with verbal discussions

of: A dummy product

7.7.6 Design Studio: another dummy was constructed incorporating solutions to these criticisms.

7.7.7 Company meeting: same as previous Company meeting. Again, both the Chief Engineer and Project Engineer made minor criticisms and the Designer was requested to draw up artwork for the printer but at the same time to construct a dummy based on this artwork for the Chief Engineer to check prior to the product's going into manufacture.

**VISUAL ASSESSMENT 7.5**

by: Industrial Designer + 2 engineers

in: Company office

method: Subjective appraisal with verbal discussions

of: A dummy product

7.7.8 Design studio: twice-up artwork was made by the Designer and a dummy was produced based on this artwork.

7.7.9 Meeting at Company location: as previous two

Company meetings.

The dummy and artwork were approved by the Chief Engineer and the Project Engineer undertook to have the new artwork in production. The Chief Engineer congratulated the Industrial Designer upon the quality of his work.

VISUAL ASSESSMENT 7.6

by: Industrial Designer + 2 engineers

in: Company office

method: Subjective appraisal with verbal approval

of: A dummy product and artwork

7.7.10 Meeting at Company location: as previous Company meeting.

The Chief Engineer stated that now the new product was in production, he didn't like certain aspects of it. He asked if it would be possible to re-do the artwork and eliminate these deficiencies. The Designer agreed that this would be possible and that he would undertake it but he did point out that the Chief Engineer had approved his previous work for production.

VISUAL ASSESSMENT 7.7

by: Industrial Designer + 2 engineers

in: Company office

method: Subjective appraisal with verbal discussions

of: An existing product

7.7.11 Design Studio: twice-up artwork was re-made by the Designer and a dummy was produced based on this artwork.

7.7.12 Meeting at Company location: as previous Company meetings.

The dummy and artwork were approved by the Chief Engineer and the Project Engineer undertook to have the new artwork in production. The Chief Engineer congratulated the

Industrial Designer again upon the quality of his work.

VISUAL ASSESSMENT 7.8

by: Industrial Designer + 2 engineers

in: Company office

method: Subjective appraisal with verbal comments

of: A dummy product and artwork

7.7.13 Note: The product is in manufacture now and there has been no further criticisms. Divisional Marketing is very pleased with the visual impact of the product. The Division Manager has also stated that he is very pleased with the visual simulations presented by the Designer for assessment by the Management.

## 7.8 Company G : Product Temperature Controller

Background: the Designer was telephoned by a Senior Engineer and asked if he could do some work on a temperature control unit that the Division was developing. The Engineer requested a meeting of the Senior Engineer, the Engineering Manager for the product and the Industrial Designer at the design studio to discuss the project. This meeting was arranged.

### 7.8.1 Meeting at Design Studio

People present:-

Industrial Designer

Engineering Manager

Senior Engineer

Room:- Conference room with permanent artificial supplementary lighting.

The Engineering Manager presented a model of a working temperature control unit, he specified what components were critical and could not be changed or moved and that the product had to meet Company design specifications. It was decided that the Designer would examine the problem and make recommendations.

#### VISUAL ASSESSMENT 8.1

by: Industrial Designer + 2 engineers

in: Design studio

method: Subjective appraisal with verbal discussions

of: Existing company product

7.8.2 Design Studio: a number of design matrices were constructed and from these matrices two models were built.

### VISUAL ASSESSMENT 8.2

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design drawings and 2 appearance models

#### 7.8.3 Meeting

People present:-

Industrial Engineer

Engineering Manager

Room:- the restaurant of a motel

The meeting was held while the Engineering Manager was having breakfast as this was the only time he had free. The Designer presented both models and the Engineering Manager was impressed visually. He could not decide on the spot which of the design solutions or aspects of the design he would like to see implemented. However, he decided to retain the models and consider the problem.

### VISUAL ASSESSMENT 8.3

by: Industrial Designer + 1 engineer

in: A motel

method: Subjective appraisal with verbal discussions

of: 2 appearance models

7.8.4 Design Studio: the Industrial Designer was telephoned by the Engineering Manager and informed that a new type of temperature controller was being built but that the outside appearance was the same as for previous versions. He was asked if he would construct an appearance model and present it the following week at a stand that was being erected at an exhibition. The Designer agreed to this and proceeded to construct a new appearance model.

VISUAL ASSESSMENT 8.4

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: An appearance model

7.8.5 The appearance model was delivered to the exhibition stand by the Designer.

7.8.6 Note: The Designer has had no further comments on the product's development from the Division.

## 7.9 Company E : Product LEDs/Numeric

Background: the Company had been developing Light Emitting Diode display units over a period of years, and was about to consider the industrial design aspects. The Industrial Design team had been introduced to the Company by an associate company.

### 7.9.1 Design Studio meeting

People present:-

Industrial Designer

Industrial Designer's Associate

Company Research Manager

The Research Manager outlined his problems of simulating the appearance of light emitting numerical displays, and the problem of developing readable numerics with a considerable reduction in costs by the removal of obsolete dots and by the permutation of driver units. This problem was discussed in great detail at the meeting. The Designers undertook to look at the problem and make a report.

7.9.2 Design Studio: the Designer studied the problem, and consequently produced a number of possible solutions. It was decided by the Designer to present the results in the form of a report. First the pages for the report were laid out. A meeting was arranged by telephone with the Research Manager.

### VISUAL ASSESSMENT 9.1

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Graphic design drawings

### 7.9.3 Company location meeting

People present:-

Industrial Designer

Research Manager

Room:- Research Manager's office, side windows, conference table.

The Industrial Designer briefed the Research Manager on the work to date and the future work development. This future development was discussed by the meeting.

The Manager agreed to accept the report.

#### VISUAL ASSESSMENT 9.2

by: Industrial Designer + 1 manager

in: Company office

method: Subjective appraisal with verbal discussions

of: Graphic design drawings

7.9.4 Design studio: the report was constructed with the addition of some further design solutions and printed.

Copies were delivered to the Company

#### VISUAL ASSESSMENT 9.3

by: Industrial Designer + associates

in: Design studio

method: Subjective appraisal with verbal discussions

of: A report

7.9.5 Company location meeting: same as previous Company meeting.

The Manager discussed the report and various design problems.

#### VISUAL ASSESSMENT 9.4

by: Industrial Designer + 1 manager

in: Company office

method: Subjective appraisal with verbal discussions

of: A report



7.9.6 Design Studio: on examining the new problem the Designer decided that the number of permutations involved was too great to handle on paper and that computer-aided permutation of variables was required. A meeting was arranged by telephone with a Computing Engineer who had an interest in design.

VISUAL ASSESSMENT 9.5

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Design sketches

7.9.7 Computer office meeting

People present:-

Industrial Designer

Computer Engineer

Room:- Narrow dingy office, side window.

The Designer discussed his problem with the Engineer who undertook some trial runs to assist the Designer. It was decided that a full CAD programme could not be developed because of insufficient funds.

VISUAL ASSESSMENT 9.6

by: Industrial Designer + 1 associated engineer  
in: Computer office  
method: Subjective appraisal with verbal discussions  
of: Graphic design sketches

7.9.8 Design Studio: the Computing Engineer forwarded the print-out to the studio. The Designer translated the print-out into the appearance of a display and checked it out.

#### VISUAL ASSESSMENT 9.7

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Graphic simulations

The resulting permutation was documented, and a slide simulation made. This was evaluated at the studio. A meeting was arranged with the Company.

#### VISUAL ASSESSMENT 9.8

by: Industrial Designer + associates  
in: Design studio  
method: Subjective appraisal with verbal discussions  
of: Product simulations

#### 7.9.9 Company location meeting

People present:-

Industrial Manager

Research Manager

Room:- Research Manager's office.

The Research Manager explained the work by the Industrial Designer. The Manager undertook to discuss the problem with his engineers.

#### VISUAL ASSESSMENT 9.9

by: Industrial Designer + 1 manager  
in: Company office  
method: Subjective appraisal with verbal discussions  
of: Product simulations

8.9.10 Note: No further work was done on the development of this aspect of LEDs.

## 7.10 Company E : Product Loudspeaker

Background: the Company wished to develop a column loudspeaker and had decided to take industrial design advice. The Industrial Design team had previously been employed by the Company.

7.10.1 Design Studio: the Designer was telephoned by a Senior Engineer and asked if it would be possible for the Designer to assist the Senior Engineer in the development of a column loudspeaker. The Designer agreed that it would be possible and a meeting was arranged.

### 7.10.2 Meeting at Company location

People present:-

Industrial Designer

Senior Engineer

Room:- Open space electrical engineering laboratory, side windows, permanent artificial supplementary lighting.

The Senior Engineer explained the principles and construction of existing column loudspeakers. He explained that he was developing a new principle for column loudspeaker construction and wished the Designer to help with the industrial design promotion and prototype model construction. The Designer agreed that this was possible and he would assist.

7.10.3 Design Studio: a matrix was drawn up for the appearance of the column loudspeaker and two cardboard models constructed to indicate the size of the column loudspeaker. A prototype working model was also constructed

#### VISUAL ASSESSMENT 10.1

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design sketches and models

7.10.4 Meeting at Company location: same as previous Company location meeting.

The Designer presented the working prototype model and the sketches illustrating the appearance of production models. The Senior Engineer undertook to test the prototype model.

VISUAL ASSESSMENT 10.2

by: Industrial Designer + 1 engineer

in: Company laboratory

method: Subjective appraisal and discussion

of: Design sketches and models

7.10.5 Design Studio: the Designer was telephoned by the Senior Engineer and informed by him that the prototype working model appeared to be working satisfactorily but no further meeting was arranged.

7.10.6 Note: No further work or development was done on the project and the Designer learned later from other sources that the Company was no longer interested in developing and producing column loudspeakers.

## 7.11 Company A : Product Grill

Background: the Company was considering re-styling and marketing an existing imported electric grill. The Industrial Designer was already acting as a consultant to the Company.

### 7.11.1 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Appliance Manager

Appliance Manager's Assistant/Product Planning

Room:- Large conference room/display room, overhead windows only, permanent artificial supplementary lighting. The existing imported grill was unpacked and assembled by the Appliance Manager's Assistant. The Appliance Manager explained that they were thinking about marketing this grill but would like it re-styled for the UK market. After some discussion the Designer explained that it would be possible to alter either the control panel only, alter the control panel and the small components or to re-style the product completely. The Appliance Manager decided that he would like to see a maximum re-styling without a complete redesigning. The Designer undertook to do this but would not guarantee that the resulting design would be present at the meeting.

#### VISUAL ASSESSMENT 11.1

by: Industrial Designer + 3 marketing men

in: Company conference room

method: Subjective appraisal and discussions

of: Existing company product

7.11.2 Design Studio: the existing product was examined and all the components that could be altered within the existing specification were detailed and alternative design proposals listed.

#### VISUAL ASSESSMENT 11.2

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Existing company product and design sketches

The existing grill was rebuilt as the new model. When fully assembled in the design studio it was decided that the colour was wrong and the model was stripped down and re-coloured.

#### VISUAL ASSESSMENT 11.3

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: An appearance model

The re-assembled model was judged by the Designer to be an improvement that lacked visual excitement.

#### VISUAL ASSESSMENT 11.4

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Finished model

#### 7.11.3 Meeting at Company location

People present:-

Industrial Designer

Product Planning Manager

Appliance Manager

Appliance Manager's Assistant/Product Planning

Room:- Product Planning Manager's small office, high side windows only, permanent artificial supplementary lighting.

The model was presented by the Designer to the meeting. The model was judged to be a vast visual improvement and the Appliance Manager undertook to take the model to the European manufacturer.

**VISUAL ASSESSMENT 11.5**

by: Industrial Designer + 3 marketing men

in: Company office

method: Subjective appraisal with verbal comment

of: Finished model

7.11.4 Note: No further development was carried out on this project and the Designer was informed later that the Appliance Manager was not considering marketing this type of grill product in the near future owing to a change in marketing policy.

## 7.12 Company D : Product Multi Meter

Background: the Company was considering re-styling and marketing an existing imported multi meter. The Industrial Designer was already acting as a consultant to the Company.

### 7.12.1 Company location meeting

People present:-

Industrial Designer

Division Manager

Marketing Manager

Project Engineer

Room:- Chief Engineer's office, badly cluttered desk and filing cabinet, side windows.

The Division Manager showed an existing multi meter that the Company proposed to market in the UK as the beginning of a process of marketing instruments, until now the Division had only been concerned in the marketing of components. The Division Manager wanted the meter re-styled to fit in with the proposed livery of future instruments, and also to be different from the existing Avo meters that dominate the market. He also explained that a model of the re-styled instrument was to be presented at a meeting the following Monday at Company Headquarters in Brussels. The Designer undertook to do this but explained that there would be no time buffers for changing their mind about the design that he produced, also, that the design would have to be delivered to someone going to this meeting before Monday and that the person who presented the model to the meeting would only see the model and be briefed about it prior to the commencement of the meeting. The Division Manager agreed to accept these limitations and arrangements were made for the model to be delivered to the Marketing Manager's house on Sunday the day before the meeting in Brussels.



#### VISUAL ASSESSMENT 12.1

by: Industrial Designer + 1 engineer + 1 marketing man  
+ 1 manager  
in: Company office  
method: Subjective appraisal and discussions  
of: Existing company product

7.12.2 Design Studio: the design styling for the existing meter was analysed and units of change that would not deviate too much from the existing production process isolated.

An existing Avo meter was style/design analysed. The proposed heraldry for the new instrument range was also noted. Matrices were drawn up for these three sets of information, and then analysed to give a proposed solution to the problem of re-styling the existing meter. A model was made of the meter in this new style and delivered to the Marketing Manager's house as arranged.

#### VISUAL ASSESSMENT 12.2

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
Of: Existing company product  
Existing competitor product  
Design sketches

#### VISUAL ASSESSMENT 12.3

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Finished appearance model

7.12.3 Meeting at Marketing Manager's house

People present:-

Industrial Designer

Marketing Manager

Marketing Manager's teenage son

Room:- Large dining room, side windows, dull lighting.

The Marketing Manager examined the model and was very impressed with the quality of the model and the proposed design solution.

He undertook to deliver the model to the meeting the following day in Brussels.

#### VISUAL ASSESSMENT 12.4

by: Industrial Designer + 1 marketing man

in: Marketing man's house

method: Subjective appraisal and comment

of: Finished appearance model

7.12.4 Note: The Designer was informed later that the model had impressed the meeting in Brussels and that it was proposed to implement the re-styling.

#### VISUAL ASSESSMENT 12.5

by: Unknown company personnel

in: Unknown company location

method: Unknown

of: Finished appearance model

### 7.13 Company F : Product Ferrodot 10x7/A

Background: an intermittent programme of work on the development of dot matrix fonts for the Ferrodot high speed magnetic print-out system had been going on between the Design team and the Company for the previous two years.

#### 7.13.1 Company location meeting

People present:-

Industrial Designer

Industrial Designer's Associate

Project Manager

Room:- Narrow office, with side windows, filing cabinets with large padlocks.

The Project Manager had been requested by a client to build a specified prototype Ferrodot machine but before the machine was programmed the client had to approve the final form of the print-out. The Company had a number of lash-up Ferrodot working parts and a tentative paper design on graph paper for a proposed font. The Manager explained that the machine being built had a dipole head that printed an oval dot, that in one state of the print-out printed horizontally to the characters and in the other state printed vertically to the characters. The Design team was asked if they could undertake to (A) design the proposed font, (B) simulate the print-out form of the proposed font for client inspection, (C) sell the proposed font to the client if the need arose. The Design team undertook to do this if access was given to the lash-up Ferrodot machines for testing proposed font designs and access given also to the Project Engineer. This was agreed by the Project Manager.

### VISUAL ASSESSMENT 13.1

by: Industrial Designer + 1 associate + manager

in: Company office

method: Subjective appraisal

of: Drawings on graph paper

7.13.2 Design Studio: at the design studio the Designers examined the problem and decided how many components and variables were involved and what method should be used to tackle the problem and what method should be used for illustrating the problem. It was decided to use a total divergent followed by convergent approach. This meant that all the variables were to be listed initially and by a process of negation the final form would be targeted upon. It was also proposed that the final stages of targeting would be in the presence of the client. All the variables were listed. A number of these variables were negated by the Industrial Designers on the spot. This left a small number of variables that the Designers could not eliminate without first simulating them upon the Company's Ferrodor lash-up machines.

### VISUAL ASSESSMENT 13.2

by: Industrial Designer + 1 associate

in: Design studio

method: Subjective appraisal and discussions

of: Drawings on graph paper

### 7.13.3 Company location working visit

People present:-

Industrial Designer

Industrial Designer's Associate

Project Engineer

Room:- Engineering laboratory containing lash-up Ferrodor machines, side windows.

All the variables that the Designers could not eliminate

were test printed on the lash-up Ferrodot machines, once with the head in a vertical dipole position, and once with the head in a horizontal dipole position. This activity continued for a full week as programming the machine by hand was extremely tedious. The programming had to be done upside down, back to front relative to the final print-out of the character. Summary assessments were made on the spot but no decisions taken.

#### VISUAL ASSESSMENT 13.3

by: Industrial Designer + 1 associate + 1 designer  
in: Company laboratory  
method: Subjective appraisal and discussion  
of: Print-out from a machine

7.13.4 Design Studio: the print-out from the machine was catalogued and photographically enlarged. The Designers now had a narrow range of variables that existed in three forms, (A) actual same-size print-outs, (B) photographic enlargements of actual print-outs, (C) graphical representation of the character programming. Telephone arrangements were made for a meeting with the clients by the Company.

#### VISUAL ASSESSMENT 13.4

by: Industrial Designer + associates  
in: Design studio  
method: Subjective appraisal and discussion  
of: Actual machine print-out  
Photographic enlargements of the machine print-out  
Graphical representations of the character programming

#### 7.13.5 Client location meeting

People present:-

Industrial Designer

Industrial Designer's Associate

Project Manager

Client Manager

Client's Project Engineer

Room:- Office with overhead windows.

Under the verbal direction of the Industrial Designer all the paperwork was examined, the problem was explained, and a number of visual inconsistencies pointed out, e.g. the possibility of confusing '5' and 'S', 'I' and '1' and 'B' and '8', etc.. Still under the verbal direction of the Designer it was decided to make simple choices first and to target down to difficult choices. All choices that could not be made by arrangement were to be placed at the end.

- A. All choices were considered in an alphabetical order.
- B. All simple choices were made and the eliminated choices crossed off the paper.
- C. All not made choices were then grouped into A/B choices isolated from the character set, A/B choices affected by the rest of the character set and very difficult choices. A/B choices isolated from the rest of the character set were made and the eliminated choices crossed off the paper. A/B choices affected by the rest of the character set were made and the eliminated choices crossed off the paper. Very difficult choices were then considered and where possible, choices were made and the eliminated choices crossed off the paper.

The remaining very difficult choices were then examined, discussed and decisions taken with the difficulty of that choice being admitted by the meeting and the eliminated choices crossed off the paper.

The final set of characters was then checked out by everyone at the meeting. No inconsistencies were found. The Design Team agreed to document the final set of characters, to give each character a reference number, and to distribute this documentation to everyone present at the meeting.

The meeting then agreed to abide by the choices it had taken.

#### VISUAL ASSESSMENT 13.5

by: Industrial Designer + 1 associate + 1 manager  
+ 1 client manager + 1 client engineer  
in: Client office  
method: Subjective analytical appraisal with analytical  
discussion  
of: Actual machine print-out  
Photographic enlargements of the machine print-out  
Graphical representations of the character programming

7.13.6 Design Studio: the final set of characters was drawn up by the Designer and reference numbers given to each character. Copies were posted to people present at the meeting. At a later date the final character set was discussed with the Project Manager over the telephone and the final set verbally agreed upon.

#### VISUAL ASSESSMENT 13.6

by: Industrial Designer + associates  
in: Design studio  
method: Subjective detailed examination and discussion  
of: Drawings on graph paper

#### 7.13.7 Company location meeting

People present:-

Industrial Designer

Industrial Designer's Associate

Project Manager

Project Engineer

Project Engineer's Assistant

Room:- Project Manager's office, narrow room with side windows, filing cabinets with large padlocks.

The Project Manager explained that truth tables had been drawn up for the final character set. These were to be sent to a supplier who would make up the program. The Manager asked if the Industrial Designers could undertake

this work. The Industrial Designer agreed to do this. The Project Engineer explained then about truth tables and how to draw them up.

7.13.8 Design Studio: the Designer examined the problems of drawing up truth tables and decided to have a master grid made to assist the uniformity of presentation. A grid was designed and printed. The Designer filled in the relevant information for each character in the grid. A copy of this information was sent to the Project Manager.

**VISUAL ASSESSMENT 13.7**

by: Industrial Designer + associates

in: Company office

method: Subjective assessment of graphical details

of: Drawings and patterns on graph paper

7.13.9 Design Studio: the Project Manager telephoned later to inform the Designers that he was very pleased with the work, the presentation was clear and concise and that he had found very little error. The Manager also informed them that it was proposed to apply for a patent on the font and could the Designers dream up some title. The Designers undertook to do this.

7.13.10 Design Studio: the Designers realised that a system for titling Ferrodots or dot matrix fonts was required, and a titling system was developed as follows:

Name of System: (Ferrodots)

Size of matrix, horizontal size and vertical size: (10x7)

Alphabet designation of series: (A)

Number of dots used if less than the matrix multiple:  
(35 therefore not applicable)

Title therefore sums up to be: (Ferrodots 10x7/A)

A letter was sent then to the client with this information.

7.13.11 Design Studio: the Company Patent Officer telephoned to explain that he was drawing up patent application form which he would send to the design studio



for the Designers to sign. He also explained that as the application was for a novel design font a United States Patent would have to be applied for as it was impossible to apply for a British Patent.

7.13.12 Design Studio: the Designer duly received the patent application forms and filled them in. These were posted to the Company Patent Officer; a copy being retained by the Designers and a copy being sent to the Project Manager.

## 7.14 Company C : Product PCM Regenerator Unit

Background: the Company was already employing the Industrial Design team on another project.

### 7.14.1 Company location meeting

People present:-

Industrial Designer

Two Industrial Design Associates

Chief Engineer

Senior Engineer, Mechanical Design

Senior Engineer, Electrical Design

Two Engineers, Mechanical Design

Two Engineers, Electrical Design

Room:- Large conference room, side windows, permanent artificial supplementary lighting.

A meeting was being held at the Company location on the final presentation of a previous project then the Chief Engineer brought up the subject of a new PCM regenerator unit. The Senior Engineer, Mechanical Design, left the room and returned dragging behind him a cast iron housing unit on a dexion trolley. The cam locked head of the unit was removed with great difficulty and the Chief Engineer explained that two regenerator units had to be housed in the case with hand clearance for the Field Engineer to lock in the coaxial cables. The lid then had to shut with the cam lock. The Senior Engineer, Electrical Design, then left the room and returned with a machined aluminium box, this, he explained was a working prototype of the PCM regenerator unit. He then explained how it worked and the difficulties they were having. One of the Engineers, Mechanical Design, then explained a number of regulations concerning the amplifier housing and the other Engineer, Mechanical Design, produced a set of engineering drawings for the housing. An engineering drawing was also provided of the Company's working prototype. The Industrial Designer undertook to explain the problem in great detail and to report back in four weeks.

#### VISUAL ASSESSMENT 14.1

by: Industrial Designer + 2 associates + 7 engineers  
in: Company conference room  
method: Subjective appraisal and discussion  
of: Existing product housing  
      Prototype product  
      Engineering drawings

7.14.2 Design Studio: at the design studio the Industrial Designer and one of his associates examined the problem from basic principles and began producing design matrix diagrams, they decided to call a meeting at the design studio to develop the design matrices.

#### VISUAL ASSESSMENT 14.2

by: Industrial Designer + associate  
in: Design studio  
method: Subjective appraisal and discussions  
of: Engineering drawings and design sketches

Design studio meeting

People present:-

Industrial Designer

Three Industrial Design Associates

Room:- Design conference room

The Industrial Designer outlined the development of the design matrices to the meeting. The group then began to discuss the design matrices and develop them further; this included both rational and irrational design proposals. The Industrial Designer considered a considerable number of the design matrix proposals as being silly and completely irrelevant, however, he decided that it would be in order to keep these proposals for discussion with the client. He also made arrangements for aspects of the matrices to be constructed into volume models.

#### VISUAL ASSESSMENT 14.3

by: Industrial Designer + 3 associates

in: Design studio conference room

method: Subjective appraisal and discussions

of: Design and engineering drawings

Eventually both engineering drawings, design matrix drawings, volume models and idea models were constructed.

#### VISUAL ASSESSMENT 14.4

by: Industrial Designer + 3 associates

in: Design studio

method: Subjective appraisal and discussions

of: Engineering drawings

Design matrix drawings

Volume models

Idea models

7.14.3 Company location meeting: people present, same as previous Company location meeting.

The Industrial Designer outlined all the development work to date to the meeting. The Chief Engineer said that he thought the work was quite interesting, however, there appeared to be some gap between the Industrial Designers and his Product Development team and suggested closer working links between the two. The Industrial Designer agreed to this and arrangements were made.

#### VISUAL ASSESSMENT 14.5

by: Industrial Designer + 2 associates + 7 engineers  
in: Company conference room  
method: Subjective appraisal and discussions  
of: Engineering drawings  
Design matrix drawings  
Volume models  
Idea models

#### 7.14.4 Company location meeting

People present:-

Industrial Designer

Industrial Design Associate

Senior Mechanical Engineer

Mechanical Engineer

Room:- A small bare conference room, side windows, centre table.

The Senior Mechanical Engineer had already arranged for the product casing and two wooden models of the regenerator unit with cables attached to be there. The Industrial Designer suggested that the centre conference table be moved to the wall so that they could all get round the housing. This was done. The meeting spent the whole day working on the ergonomic assessment of storing the two regenerator housings in the case and the problems involved. A number of conclusions was reached and the Senior Mechanical Engineer agreed to have their wooden models altered.

#### VISUAL ASSESSMENT 14.6

by: Industrial Designer + 1 associate + 2 engineers  
in: Company conference room  
method: Subjective appraisal and discussions  
of: Wooden models and ergonomic aspects

7.14.5 Design Studio: the Industrial Designer constructed a number of expanded polystyrene models that explained

some of the problems and solutions to these problems.

VISUAL ASSESSMENT 14.7

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Volume and assembly models

7.14.6 Company location meeting

People present:-

Industrial Designer

2 Industrial Design Associates

Senior Mechanical Engineer

Mechanical Engineer

Room:- Same as previous meeting

The Senior Mechanical Engineer outlined the modifications to the volume models and the Industrial Designer demonstrated his expanded polystyrene models. The Industrial Designer explained to the meeting that although the product was being developed around the housing, handling of the product prior to arrival at the field site should also be considered and he asked the Senior Mechanical Engineer to investigate the pre-field site arrival life of the product. He undertook to do this.

VISUAL ASSESSMENT 14.8

by: Industrial Designer + 2 associates + 2 engineers

in: Company conference room

method: Subjective appraisal and discussions

of: Volume models

7.14.7 Company location meeting: people present, same as previous meeting.

The Senior Mechanical Engineer outlined the life of the product from production to field site installation and after-installation servicing. The Industrial Designer

drew a logic diagram that detailed out all the ergonomic and design problems that this presented. By this time it was becoming increasingly obvious that the possibility of storing the regenerator units in the product housing was possible but problems were developing in locating the regenerator unit just prior to installation.

**VISUAL ASSESSMENT 14.9**

by: Industrial Designer + 2 associates + 2 engineers  
in: Company conference room  
method: Subjective appraisal and discussions  
of: Volume models and logic diagrams

7.14.8 Company location meeting: same as previous meeting. Field site installation simulations were carried out and a systematic technique of installation was developed. The Mechanical Engineer made a record of this.

**VISUAL ASSESSMENT 14.10**

by: Industrial Designer + 2 associates + 2 engineers  
in: Company conference room  
method: Subjective appraisal and discussions  
of: Volume models, logic diagrams and ergonomic simulations

7.14.9 Company Location: the Designer was at the Company location to see the Chief Engineer on another subject when the Senior Mechanical Engineer came over to show him a recent development on the regenerator unit. He said that although there was now a number of electromechanical problems still to be solved the project was coming along slowly but satisfactorily. The Designer discussed the various odd details with him.

VISUAL ASSESSMENT 14.11

by: Industrial Designer + 1 engineer  
in: Company drawing office  
method: Subjective appraisal and discussions  
of: Prototype model drawings

7.14.10 Company Location: the Designer was visiting a Company Mechanical Engineer on another subject when the Senior Mechanical Engineer showed him the recent developments on the regenerator unit and a new prototype unit that had just been delivered from the workshop, various details were discussed.

VISUAL ASSESSMENT 14.12

by: Industrial Designer + 1 engineer  
in: Company drawing office  
method: Subjective appraisal and discussion  
of: Prototype model

7.14.11 The Industrial Designer heard nothing further officially on the project. However, when visiting another Company location he was informed the regenerator unit was in production.



## 7.15 Company A : Product Radios

Background: the Company was considering the design of the next generation of radios. The Industrial Designer was already acting as a consultant to the Company.

### 7.15.1 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/TVs

Product Planning Manager's Assistant/Radios

Room:- Product Planning Manager's small office.

The Product Planning Manager explained the marketing plan for radios. Six radios were to be produced, and two were to be designed by the Consultant Industrial Designer. He went on to explain that those to be designed by the Consultant Industrial Designer were to be built around the existing chassis of the present radios but with larger batteries. He also specified a marketing style for these radios and a timetable for design development. The Designer undertook to examine the problem and to produce a number of presentation drawings.

#### VISUAL ASSESSMENT 15.1

by: Industrial Designer + 3 marketing men

in: Company office

method: Subjective appraisal and discussions

of: Existing company products

7.15.2 Design Studio: the Designer examined the chassis involved and drew up a diagram of the chassis plus new battery sizes and appearance dimensions. A diagram was produced of appearance sizes and control orientation. The Designer drew up then a number of presentation drawings. Two cardboard models were made based on two of the presentation drawings.

#### VISUAL ASSESSMENT 15.2

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Presentation drawings and 2 cardboard models

7.15.3 Company location meeting: as previous meeting. The presentation drawings were pinned on to a wall and the cardboard models placed on the table. The Designer then explained his drawings and models and the types of decision that the marketing people had to make. The Product Planning Manager decided to call in the Marketing Manager. The Designer had to explain all again to him. A discussion ensued as to the merits of the marketing plan and the marketing plan was reconstructed on the spot. The Designer and the Product Planning Manager then explained to the Marketing Manager about the very short time available before the design freeze. It was then agreed that the Designer would revise his work to the new marketing plan on model A and present this information. Decisions would be taken on this model at the next meeting and specifications issued for an appearance model to be built. At the following meeting it was agreed that the Designer would revise his work to the new marketing plan on model B and present this information.

#### VISUAL ASSESSMENT 15.3

by: Industrial Designer + 4 marketing men

in: Company office

method: Subjective appraisal and discussions

of: Presentation drawings + 2 cardboard models

7.15.4 Design Studio: the Designer reconstructed his specifications for model A, re-drew his presentation drawings and produced two cardboard models.

VISUAL ASSESSMENT 15.4

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Presentation drawings + 2 cardboard models

7.15.5 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/TVs

Room:- Product Planning Manager's small office.

The presentation drawings were pinned to the wall and cardboard models laid on the table. The Designer then explained his drawings and models and the decisions that had to be made at the meeting. The meeting examined the drawings and models, the Product Planning Manager made the decisions which the Designer noted and he undertook to have an appearance drawing made up.

VISUAL ASSESSMENT 15.5

by: Industrial Designer + 2 marketing men

in: Company office

method: Subjective appraisal and discussion

of: Presentation drawings and 2 cardboard models

7.15.6 Design Studio: the Designer drew up a design drawing for the Modelmaker.

VISUAL ASSESSMENT 15.6

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design drawing

#### 7.15.7 Modelmaker's Studio

People present:-

Industrial Designer

Modelmaker

The design drawing was examined by the Modelmaker and the standard for the appearance model decided upon. The Modelmaker undertook to make the model in the time specified and agreed to make allowances in his timetable for model B also.

#### VISUAL ASSESSMENT 15.7

by: Industrial Designer + Modelmaker

in: Modelmaker's studio

method: Subjective appraisal and discussions

of: Design drawings

7.15.8 Design Studio: the Designer reconstructed his specifications for model B, re-drew his presentation drawings and produced two cardboard models.

#### VISUAL ASSESSMENT 15.8

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Presentation drawings + 2 cardboard models

7.15.9 Company location meeting: people present, as previous Company meeting.

The presentation drawings were pinned to the wall and cardboard models laid on the table. The Designer then explained his drawings and models and the decisions that had to be made at that meeting. The meeting examined the drawings and models, the Product Planning Manager made decisions which the Designer noted and he undertook to have an appearance drawing made up.

VISUAL ASSESSMENT 15.9

by: Industrial Designer + 2 marketing men

in: Company office

method: Subjective appraisal and detailed discussions

of: Presentation drawings + 2 cardboard models

7.15.10 Design Studio: the Designer drew up a design drawing for the Modelmaker.

VISUAL ASSESSMENT 15.10

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design drawing

7.15.11 Modelmaker's Studio: as previous studio meeting. The design drawing was examined by the Modelmaker and a number of points queried. The Modelmaker explained that the A model was going as planned and both models A and B would be completed on time.

VISUAL ASSESSMENT 15.11

by: Industrial Designer + Modelmaker

in: Modelmaker's studio

method: Subjective appraisal and discussions

of: Design drawing

7.15.12 Design Studio: the Designer monitored the progress of the model-making and answered various technical queries by telephone from the Modelmaker.

7.15.13 Modelmaker's Studio: same as for previous meeting.

The Modelmaker presented the A and B models. The Designer

examined the models to see if they conformed to his original specification and agreed to accept the models.

VISUAL ASSESSMENT 15.12

by: Industrial Designer + Modelmaker  
in: Modelmaker's studio  
method: Subjective appraisal and discussions  
of: 2 finished appearance models

7.15.14 Design Studio: the Designer wrote up a specification to back up both the models.

VISUAL ASSESSMENT 15.13

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: 2 finished appearance models

7.15.15 Company location meeting: as previous Company meeting.

The finished models were laid on the table, the Product Planning Manager said that the designs appealed to him immediately and he was very pleased. The Designer was then asked to explain the written specification. The Product Planning Manager decided then to call in the Marketing Manager and explained everything to him. The Marketing Manager said he was quite pleased and left the meeting. The Product Planning Manager undertook to deliver the models and specifications to design production.

VISUAL ASSESSMENT 15.14

by: Industrial Designer + 3 marketing men

in: Company office

method: Subjective appraisal and detailed discussions

of: 2 finished appearance models

## 7.16 Company A : Product Unit Audios

Background: the Industrial Design Team had been commissioned by the Company to update their current range of unit audios.

### 7.16.1 Client location meeting

People present:-

Product Planning Manager

Industrial Designer

Room:- Product Planning Manager's office, side windows, desk in centre of room.

The Product Planning Manager was enquiring about the work to date on a nebulous brief project and expressed his militant desire to see results soon although he admitted that the brief was a very free one. The Designer explained that design analysis was still taking place and a report would be issued. The Manager said that they preferred to make judgment on models but were prepared to accept appearance drawings. The Designer undertook to develop some design proposals forthwith.

7.16.2 Design Studio: the Designer examined the design analysis to date and drew up some proposals for new designs. Outline general arrangement design were drawn up and a number of models constructed.

#### VISUAL ASSESSMENT 16.1

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design analysis sketches



## VISUAL ASSESSMENT 16.2

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Appearance models

### 7.16.3 Company location meeting

People present:-

Industrial Designer

Industrial Designer's Associate

Associated Company Industrial Design Co-ordinator

Product Planning Manager

Room:- Product Planning Manager's small office, side windows, waist level side bench space.

The Associated Company Industrial Design Co-ordinator asked the Product Planning Manager to leave the room while the models were brought in and laid out as he thought some kind of dramatic presentation would be appropriate. The Product Planning Manager agreed to this and left the room. The Industrial Designer brought the models in, unpacked them and laid them on the side window space. The Co-ordinator and the Industrial Designer's Associate examined the models for the first time and generally agreed that they were excellent. The Co-ordinator insisted on covering the models with dustsheets and suggested that the Industrial Designer uncovered the models as he discussed each shape of the project. The Industrial Designer reluctantly agreed to this. The Co-ordinator then invited the Product Planning Manager back into his office.

The Industrial Designer's Associate made an introductory speech and the Industrial Designer then began explaining the project work to date uncovering the models as he went along. The Product Planning Manager showed great interest in the collection of models and immediately telephoned the Marketing Manager and invited him to join them saying that he had 'something to knock his eyes out with'. The Marketing Manager arrived and was introduced to everyone and the Product Planning Manager explained the models to him.

The Marketing Manager then suggested that the Senior Audio Engineer be invited to join the meeting and the Product Planning Manager did this. The Senior Audio Engineer arrived and was introduced to everyone and the Marketing Manager explained the models to him. He said he found them quite exciting. The Product Planning Manager asked the Marketing Manager how he thought the project should be developed. The Marketing Manager and the Senior Audio Engineer then discussed details of the development of a narrower range of units. Eventually the Marketing Manager briefed the Industrial Designer on a narrower range of units that he would like to see. The Designer agreed to this and a date was arranged for the next meeting with the Product Planning Manager.

**VISUAL ASSESSMENT 16.3**

by: Industrial Designer + 1 associate designer + 1 design co-ordinator + 1 engineer + 2 marketing men

in: Company office

method: Subjective appraisal and discussion

of: Finished models

7.16.4 Design Studio: the Industrial Designer examined the new verbal specifications and constructed some diagrams.

**VISUAL ASSESSMENT 16.4**

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design diagrams

Three models were designed and constructed with a range of interchangeable coloured components.

#### VISUAL ASSESSMENT 16.5

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Finished appearance models

#### 7.16.5 Company location meeting

People present:-

Industrial Designer

Industrial Design Associate

Associated Company Industrial Design Co-ordinator

Product Planning Manager

Room:- Product Planning Manager's small office.

The Industrial Designer unpacked and assembled the models and discussed them with the Product Planning Manager.

The Industrial Designer then demonstrated the interchangeability of coloured components. The Product Planning Manager invited the Marketing Manager and Senior Audio Engineer to attend the meeting. When they had arrived, the Industrial Designer was allowed to explain the models and interchangeability of coloured components once more. The three Company personnel then discussed further development for the range of units and also decided on a completely different set of colour components. However, the Senior Audio Engineer could not decide exactly how many components would be involved. He agreed to work further on the concept and would inform the Designer later on. It was decided that the Designer would do no further work until he had heard from the Senior Audio Engineer.

#### VISUAL ASSESSMENT 16.6

by: Industrial Designer + 1 design associate + 1 engineer  
+ 2 marketing men  
in: Company office  
method: Subjective appraisal and verbal discussion  
of: Appearance models

7.16.6 Design Studio: some six weeks later the Industrial Designer was telephoned by the Senior Audio Engineer and informed that there was a product planning meeting to be held the following day and could he attend with some indication of his new designs. The Designer informed him that he had not received information concerning the exact number of components. The Engineer apologised for this and gave the details over the telephone. The Designer said that it would not be possible to attend the meeting with models and would a lifesize drawing do instead?. The Engineer thought that this was satisfactory and apologised for the delay in supplying the relevant information. The Designer proceeded to produce the lifesize drawings designing the product as he proceeded.

VISUAL ASSESSMENT 16.7

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Finished life-size drawings

7.16.7 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/Unit Audios

Senior Audio Engineer

Design Engineer

Room:- Company office, large side windows, desk, several chairs.

The Industrial Designer presented the drawing to the meeting and this was discussed in great detail. The Audio Engineer then presented a number of components that would be used on the product.

At this point the meeting was joined by another engineer who also began discussing the shape, costing and function of the product. The Product Planning Manager's Assistant suggested that the drawings were insufficient upon which to

make judgments and asked the Industrial Designer if it would be possible to make two models each representing different aspects of unresolved situations. The Designer agreed to this and the meeting broke up. Afterwards the Industrial Designer was informed that the latecomer to the meeting had been the Company's Chief Engineer.

#### VISUAL ASSESSMENT 16.8

by: Industrial Designer + 3 engineers + 2 marketing men  
in: Company office  
method: Subjective appraisal and detailed discussion  
of: Finish life size drawings

7.16.8 Design Studio: the Industrial Designer began detailing out the drawings for the production models, resolving a number of design problems as he progressed. The Designer made arrangements for the models to be produced. The Designer telephoned the Product Planning Manager and a meeting was arranged.

#### VISUAL ASSESSMENT 16.9

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Design detail drawings

#### 7.16.9 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/Unit Audios

Senior Audio Engineer

Room:- Large conference/display room. Overhead windows only, permanent artificial supplementary lighting.

The Designer unpacked the models and arranged them on a central conference table. The meeting examined the models

and expressed great delight at a number of novel solutions to design problems.. They began discussing the costing for implementing these design solutions. The Marketing Manager walked into the meeting and expressed great satisfaction at the models he saw and congratulated the Product Planning Manager and left the room. The meeting carried on discussing the production timescale for the models and the meeting eventually broke up. After the meeting the Product Planning Manager privately informed the Industrial Designer that he was very pleased with the meeting and the reaction from the Engineer and his Marketing Manager.

**VISUAL ASSESSMENT 16.10**

by: Industrial Designer + 1 engineer + 3 marketing men

in: Company conference room

method: Subjective appraisal and detailed discussions

of: 2 appearance models

## 7.17 Company A : Product Loudspeakers

Background: the Company was considering designing a series of loudspeakers to match an existing range of unit audios. The Industrial Designer was already acting as a consultant to the Company.

### 7.17.1 Company location meeting

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/Unit Audios

Room:- Product Planning Manager's small office.

The Product Planning Manager explained that a series of loudspeakers was required. This range was explained to the Designer. The Designer queried the size of the loudspeaker drive units and the acoustic volumes required. The Manager said not to worry too much about the functional size as their engineer in loudspeaker acoustics would fit his specifications to the appearance design but the material on the front of the loudspeaker had to be acoustically transparent and available on the market. The Designer undertook to do this work.

7.17.2 Design Studio: the Designer examined the existing range of unit audio and noted the overall appearance styles and dimensions. A matrix was drawn up based on this information illustrating the types of loudspeaker arrangements possible.

#### VISUAL ASSESSMENT 17.1

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Existing product range

VISUAL ASSESSMENT 17.2

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design diagram sketches

A series of models was detailed based on the information from the matrix grid and marketing components. The Modelmaker was telephoned and he agreed to make the models. Design drawings for the models were posted to the Modelmaker and orders were placed for materials from the relevant suppliers to be delivered to the Modelmaker's studio.

VISUAL ASSESSMENT 17.3

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design drawings

7.17.3 Modelmaker's Studio

People present:-

Industrial Designer

Modelmaker

Room:- Modelmaker's workshop with woodworking machinery. The Designer examined the finished models and the Modelmaker explained some of his difficulties in making the models. The Designer took delivery of the models.

VISUAL ASSESSMENT 17.4

by: Industrial Designer + Modelmaker

in: Modelmaker's workshop

method: Subjective appraisal and detailed discussions

of: Finished models



7.17.4 Design Studio: the Designer added the final details to the models and drew up a written specification.

**VISUAL ASSESSMENT 17.5**

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Presentation models and written specifications

**7.17.5 Company location meeting**

People present:-

Industrial Designer

Product Planning Manager

Product Planning Manager's Assistant/Unit Audios

Senior Audio Engineer

Audio Engineer/Loudspeakers

Room:- Large conference/display room, overhead windows only, permanent artificial supplementary lighting.

The models were presented by the Designer and examined by the meeting. The Audio Engineer/Loudspeakers examined the sizes of all the models and stated that only one model presented serious difficulties to Audio Engineering. The meeting was undecided as to which model to choose. The Marketing Manager walked into the meeting on some other business and on walking out said that he liked the models. The Product Planning Manager decided to make no decision on the models and let Audio Engineering examine the problem in greater detail.

**VISUAL ASSESSMENT 17.6**

by: Industrial Designer + 2 engineers + 2 marketing men

in: Company conference room

method: Subjective appraisal and detailed discussions

of: Finished models

7.17.6 Note: The Designer has heard nothing further on the project.

## 7.18 Company D : Product Bench Power Supply

Background: the Company had decided to develop a bench power unit. The Industrial Designer had previously been employed by the Company.

7.18.1 Design Studio: the Industrial Designer was telephoned by a Company Project Engineer and asked if he could come to the Company location to discuss an industrial design project and that the Division Manager had requested specifically the Industrial Designer's expertise as soon as possible. The Designer made arrangements for visiting the Company.

### 7.18.2 Company location meeting

People present:-

Industrial Designer

Project Engineer

Room:- Project Engineer's desk in an open plan office with other engineers around.

The Project Engineer outlined the project and showed some vague circuit design sketches. A book on radio valves was produced by the Engineer who said that he envisaged the product to be roughly the same size as the book. A catalogue in French of the buttons that the Company wanted to use was produced also. He said also there would have to be a heat-sink somewhere but not to worry about this for the time being. The Project Engineer telephoned the Division Manager and a meeting was called to take place in his office forthwith.

#### VISUAL ASSESSMENT 18.1

by: Industrial Designer + 1 engineer

in: Company open plan office

method: Subjective appraisal and detailed discussion

of: Sketches and components

### 7.18.3 Further meeting

People present:-

Industrial Designer

Project Engineer

Division Manager

Marketing Manager

Chief Engineer

Room:- Division Manager's office, conference table, side windows.

The Division Manager expressed his concept of the product and how they wanted the product to resemble a desk calculator. He then produced an office desk calculator. The Designer asked him what the existing similar products looked like and the Chief Engineer left the meeting to obtain a bench power supply from one of his engineers in the development laboratories. He eventually returned with one. Both the desk calculator and the bench power supply were discussed. The Division Manager closed the meeting by expressing the urgency of developing the project and of producing an innovative product. The Designer undertook to get on with the work right away.

#### VISUAL ASSESSMENT 18.2

by: Industrial Designer + 2 engineers + marketing man  
+ 1 manager

in: Company office

method: Subjective appraisal and detailed discussion

of: Existing products

8.18.4 Design studio: at the design studio the Designer examined the problem and worked out the possibility of making a cardboard model that would embody the Company's concepts to date.

VISUAL ASSESSMENT 18.3

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Design sketches

A cardboard model was constructed and the Designer telephoned the Project Engineer and meeting was arranged for the next day.

VISUAL ASSESSMENT 18.4

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Cardboard model

7.18.5 Company location meeting

People present:-

Industrial Designer

Project Engineer

Room:- Project Engineer's desk in open plan office.

The Industrial Designer showed the Project Engineer his cardboard model. The Engineer expressed great delight in this model and telephoned the Division Manager who said he would come down to the Engineer's desk. He too expressed great delight in the cardboard model and said that he would take it to show the Company's Executive Director and asked the Designer if he could return in two weeks' time to discuss further developments. The Designer agreed to this and details were agreed with the Project Engineer.

#### VISUAL ASSESSMENT 18.5

by: Industrial Designer + 1 engineer + 1 manager

in: Company open plan office

method: Subjective appraisal and verbal comment

of: Cardboard model

#### 7.18.6 Company location meeting

People present:-

Industrial Designer

Project Engineer

Division Manager

Chief Engineer

Room:- Division Manager's office.

The Division Manager stated that the Company's Executive Director had seen the model but had offered no value judgment on the model except to approve further the total project. The Project Engineer outlined that they had obtained samples of the buttons from the French Company, and explained their interlocking arrangements. The Chief Engineer expressed his view that for laboratory work the front control panel should be angled. The Division Manager then outlined his proposal about making a product physically compatible with an existing Company product. A sample of the Company's product was produced. The Designer undertook to examine the new proposals and report back. Arrangements were made for a further meeting.

#### VISUAL ASSESSMENT 18.6

by: Industrial Designer + 2 engineers + 1 manager

in: Company office

method: Subjective appraisal and detailed discussion

of: Existing components and sketches

7.18.7 Design Studio: the Industrial Designer re-examined the project and gradually worked out new design proposals. The Designer found it possible to express these proposals in

terms of eight cardboard models and he constructed the eight models.

**VISUAL ASSESSMENT 18.7.**

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design sketches and 8 cardboard models

**7.18.8 Company location meeting**

People present:-

Industrial Designer

Project Engineer

General Manager

Marketing Manager

Room:- Marketing Manager's office, large room with side windows, two abutting desks in the centre and only two chairs.

The people present were all standing and moving around.

The Designer cleared the paperwork from the desks and laid out the eight models  $M_{1-8}$  but before the Designer could say anything the General Manager said that he liked 'that one',  $M_3$ , which the Designer didn't like personally. The Designer stated that it would be a much more sophisticated method of choosing if the General Manager decided which of the design proposal models he didn't like and remove these from the table to leave eventually one that would appear more suitable than the others rather than immediately trying to choose one that at present appeared to appeal to him. The General Manager agreed to this selection method and proceeded to select and remove those which did not appeal to him.

From the possible choices of  $M_{1-8}$  he removed  $M_1$ ,  $M_4$ ,  $M_5$  leaving  $M_2$ ,  $M_3$ ,  $M_6$ ,  $M_7$ ,  $M_8$ . He removed  $M_2$ ,  $M_7$  and  $M_8$  then leaving  $M_3$  and  $M_6$ . He removed  $M_3$  then which left  $M_6$ . ( $M_6$  was the favoured choice of the Designer).

The General Manager expressed great delight in this choosing method and replaced all the models on the desk top and

telephoned the Sales Manager to invite him to join the meeting. When the Sales Manager arrived, the General Manager outlined the project and asked the Sales Manager to choose from the eight models by removing those he didn't like. The Sales Manager proceeded to do this.

From the choice of  $M_{1-8}$  he removed  $M_1$ ,  $M_5$  and  $M_7$ , followed by  $M_3$ , then  $M_4$ , then  $M_8$  then  $M_6$ , leaving  $M_2$ .

The General Manager decided to ignore the Sales Manager's choice and began to explain why that which he had chosen would be the best model to choose.

The General Manager then expressed his desire to take the model to a European meeting the following Monday. The Designer expressed his displeasure at the taking of a general card model to an important meeting and he offered to rebuild a more sophisticated cardboard model. The General Manager accepted his proposal provided the model could be delivered to him on the Monday morning. After some detailed discussion it was agreed that the Designer would deliver the model to the Marketing Manager's home on Sunday afternoon. The Project Engineer obtained a number of supporting components for the model.

#### VISUAL ASSESSMENT 18.8

by: Industrial Designer + 1 engineer + 2 marketing men  
+ 1 manager

in: Company office

method: Subjective, but using a sophisticated decision process with verbal comments

of: 8 cardboard models

7.18.9 Design Studio: the Designer constructed a more sophisticated cardboard model.

7.18.10 Marketing Manager's home

People present:-

Industrial Designer

Marketing Manager

Room:- Large dining room, side windows, dull lighting.



The Marketing Manager examined the model and said that he would deliver it to the General Manager the following morning.

VISUAL ASSESSMENT 18.9

by: Industrial Designer + 1 marketing manager  
in: Marketing man's house  
method: Subjective appraisal with verbal comment  
of: A finished cardboard model

7.18.11 Design Studio: the Designer was telephoned by the Chief Engineer and asked to visit the Company to discuss the project further. The Designer agreed to this and arrangements were made.

7.18.12 Company location meeting

People present:-

Industrial Designer

Chief Engineer

Replacement Project Engineer

Room:- Chief Engineer's office, side windows, badly cluttered desk and bookcases.

The Project Engineer outlined the fact that latest circuit developments were such that the case containing them would have to be bigger and a larger heat-sink would have to be added at the back. The Designer undertook the examination of the model with a view to making allowance for the new requirements. Arrangements were made for a meeting in the same place the following week.

7.18.13 Design Studio: the Designer made a number of rough cardboard models that conformed to the new requirements. He examined these models, chose one and proceeded to construct a more sophisticated model of this design.

VISUAL ASSESSMENT 18.10

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Several rough cardboard models

7.18.14 Company location meeting

People present:-

Industrial Designer

Chief Engineer

Room:- Chief Engineer's office

The model was examined by the Chief Engineer and he agreed with the Designer's decisions. The Division Manager was telephoned and he said he would come down to the meeting. The Division Manager arrived and said that he liked the design, and he left the meeting. The Chief Engineer then expressed some concern at the speed of developments and the fact that he needed to settle down and think quietly about the project. The Designer invited him to his design studio to review the project. The Chief Engineer agreed to this and arrangements were made.

VISUAL ASSESSMENT 18.11

by: Industrial Design + 1 engineer + 1 manager

in: Company office

method: Subjective appraisal and discussion

of: Sophisticated cardboard model

7.18.15 Design Studio

People present:-

Industrial Designer

Chief Engineer

Senior Production Engineer

The meeting reviewed the project and problems to date and produced two design solutions. The 'A' product which was the project under review at that moment and a 'B' product that showed the possible development of the 'A' product to a more sophisticated product. The Chief Engineer decided

that he wanted to have a dramatic presentation of this new concept for a marketing meeting. He asked the Designer if he could make two sophisticated cardboard models for the meeting. The Designer undertook to do this work. The rest of the meeting was spent in detailing out the requirements for the 'A' and 'B' product models. Arrangements were made for the Chief Engineer to set up a marketing meeting and for the Industrial Designer to meet with the Chief Engineer on the morning before the afternoon's meeting. The Designer proceeded to construct the two models.

**VISUAL ASSESSMENT 18.12**

by: Industrial Designer + 2 engineers

in: Design studio

method: Subjective appraisal and detailed discussions

of: Design sketches

**7.18.16 Company location meeting**

People present:-

Chief Engineer

Industrial Designer

Room:- Chief Engineer's office

The Chief Engineer examined the two models and expressed his pleasure at seeing them. He telephoned the Division Manager and invited him to see the new models. The Division Manager arrived in the office and he expressed his great pleasure in seeing the two models and approved the new concept behind the 'B' model. He left the meeting then. The Designer and the Chief Engineer went to lunch and discussed their strategy for the marketing meeting that would follow after lunch.

**VISUAL ASSESSMENT 18.13**

by: Industrial Designer + 1 engineer + 1 manager

in: Company office

method: Subjective appraisal with verbal comment

of: Two sophisticated cardboard models

#### 7.18.17 Marketing meeting

People present:-

Industrial Designer

Chief Engineer

Division Manager

Project Engineer

Marketing Manager

Marketing Product Co-ordinator

Room:- Large conference room, side windows, large conference table and adequate seating.

The Chief Engineer outlined the project to date and presented the two new models to the meeting. The Marketing people showed great interest in the new designs and expressed their confidence in selling the product. Detailed arguments followed as to whether to launch the 'A' product first, or the 'B' product first, or both 'A' and 'B' together. It was decided to stay with the 'A' product for the time as the circuit development was only geared up for the 'A' product development. Then the Project Engineer demonstrated a working circuit for the 'A' model. The Division Manager later said that he was satisfied with the product and we should now consider how to manufacture and cost up the product. The Chief Engineer undertook to do this. The meeting broke up and the Chief Engineer quietly advised the Designer that he would be contacted in the near future when the project development needed him next.

#### VISUAL ASSESSMENT 18.14

by: Industrial Designer + 2 engineers + 2 marketing men  
+ 1 manager

in: Company conference room

method: Subjective appraisal and detailed discussions

of: 2 sophisticated cardboard models

7.18.18. Design Studio: the Industrial Designer was telephoned by the Chief Engineer and invited to the Company to discuss new development on the project.

#### 7.18.19 Company location meeting

People present:-

Chief Engineer

Industrial Designer

Project Engineer

Room:- Chief Engineer's office

The Chief Engineer informed the Designer that they had now costed up the product and that the costing was exceeding the first estimates and that certain elements in the design would have to be re-arranged to help reduce the cost. It appeared that the proposed push-button arrangement involved excessive time on assembly and the Chief Engineer proposed a more simplified form of assembly. The Chief Engineer said that he appreciated that this would affect considerably the present arrangement of the design. He also explained that the heat-sink was possibly incapable of dealing adequately with the heat dissipation problem, however, they were going to try some further tests on this. The Industrial Designer said that he appreciated these problems and would undertake to revise the design in the light of this information. He promised to return the following week with modified design proposals.

#### VISUAL ASSESSMENT 18.15

by: Industrial Designer + 2 engineers

in: Company location

method: Subjective appraisal and detailed discussions

of: Design sketches and components

7.18.20 Design Studio: the Designer re-designed the layout of the front control panels for the 'A' and 'B' models and constructed two simple cardboard models.

VISUAL ASSESSMENT 18.16

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design drawings and cardboard models

7.18.21 Company location meeting

People present:-

Industrial Designer

Chief Engineer

Product Co-ordinator

Room:- Chief Engineer's office

The Designer showed the Chief Engineer the two new models and the Chief Engineer thought they were quite interesting. However, the project was beginning to run behind schedule and production had to be considered seriously and soon.

The Designer expressed the notion that the present 'ity-bity' development was the holding factor and that the Industrial Designer, Chief Engineer, and Senior Production Engineer should go and hide somewhere in the Company for a few days and pull the project back on to schedule. The Chief Engineer thought that this was a good idea and asked his secretary to make arrangements for the following week.

VISUAL ASSESSMENT 18.17

by: Industrial Designer + 1 engineer + 1 marketing man

in: Company office

method: Subjective appraisal and detailed discussion

of: 2 cardboard models

7.18.22 Design Studio: at the design studio the Designer reviewed the project to date and brushed up on his knowledge of group thinking and problem solving techniques. He decided, however, not to use any specific technique but to rely on an amalgamation of the essences of these techniques. He also collected sketching equipment such as

A2 lay-out pads and felt-tipped pens for the meeting.

VISUAL ASSESSMENT 18.18

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Sketches on paper

7.18.23 Company location meeting

People present:-

Industrial Designer

Industrial Design's Associate

Senior Production Engineer

Chief Engineer

Room:- Conference room near Senior Production Engineer's office. High side windows with utility furniture and blackboard.

The Chief Engineer outlined the project concept and all the problems with which they were now faced without any view to a preconceived design. The Industrial Designer assembled all the product requirements and proceeded to interlock them together to see what resulted. The resulting shape in diagram form was difficult to appreciate and the Industrial Designer offered to construct a model of it that night. The meeting broke up late and agreed to assemble next morning at the same place.

VISUAL ASSESSMENT 18.19

by: Industrial Designer + 1 associate + 2 engineers  
in: Company conference room  
method: Subjective appraisal and detailed discussions  
of: Design sketches, components and cardboard models

7.18.24 Design Studio: later that evening and into the early hours of the morning the Designer constructed two models that expressed the concepts as decided by the

meeting. The Designer appreciated soon that the proposed design solution would not satisfy anybody. However, he thought it best to present the model to indicate that the present ideal solutions to the Chief Engineer's problems were unsatisfactory.

VISUAL ASSESSMENT 18.20

by: Industrial Designer

in: Design studio.

method: Subjective appraisal

of: Design sketches and cardboard models

7.18.25 Company location meeting: same as the previous meeting.

The Designer produced the models and as expected the Chief Engineer expressed his horror. It was decided to work backwards from this model to try and achieve another solution to the problems. It soon became apparent that there was considerable wastage on some of the problem solutions and it was decided to eliminate this wastage. Paring off this wastage led to a redistribution of the rest of the problem solutions. It was becoming apparent that an innovative design solution was developing. The Designer said if the emerging innovative solution was wrapped in advance clear functional styling then the problem solution would meet everyone's requirements. The Designer undertook to make a model of this backed up by several appearance sketches and to present this to the meeting the following morning. He made arrangements for his associate to do the appearance sketches at his home that night while he would construct the models in the studio. It was appreciated between the designers that they would not see each other's work until the meeting the following day.



VISUAL ASSESSMENT 18.21

by: Industrial Designer + 1 associate + 2 engineers  
in: Company conference room  
method: Subjective appraisal and detailed discussions  
of: Design sketches and cardboard models

7.18.26 Design Studio: at the design studio the Designer constructed a cardboard model.

7.18.27 Company location meeting: same as previous meeting  
The sketch drawings were hung around the room and the cardboard model was placed on the table. The Chief Engineer expressed great delight in the proposed design solution and insisted on calling the Division Manager. The Division Manager was shown the model and sketches. He was highly pleased and called in the Marketing Manager; the Marketing Manager arrived and he was highly pleased too. The Division Manager decided to take out design patent on the design and asked for all the notation concerned; the new design was to be locked away and the model to be kept out of sight. He instructed the Product Development team to tidy up the design and build a working prototype.

VISUAL ASSESSMENT 18.22

by: Industrial Designer + 2 engineers + 1 marketing man + 1 manager  
in: Company conference room  
method: Subjective appraisal and verbal comments  
of: Design sketches and a cardboard model

7.18.28 Design Studio: the Designer was telephoned by the Senior Production Engineer and asked to come in and see the prototype. The Designer agreed to this.

7.18.29 Company location meeting  
People present:-

Industrial Designer

Chief Engineer

Senior Production Engineer

Project Engineer

Room:- Chief Engineer's office

The Senior Production Engineer produced a prototype working model and the Project Engineer considered that the heat dissipation problem solution was working satisfactorily. The Industrial Designer, however, said that the present shape of the prototype model was not totally satisfactory, and offered to build a solid wooden model coloured up to a proposed production colour. It was during discussion of the colour using colour cards that the Designer learned that the other three people present at the meeting were colour deficient; two of them refused to make any colour choice and the Chief Engineer insisted that the colour should be brown. The Chief Engineer also said that the weight and centre of gravity of the prototype was such that it was difficult to pick up from the bench and he would like to see a handle on the object. The Project Engineer also said that the handle could be used for stowing leads. The Designer undertook to consider all this and make quickly a block colour model. The Senior Production Engineer gave the Designer a set of general arrangement drawings.

#### VISUAL ASSESSMENT 18.23

by: Industrial Designer + 3 engineers

in: Company office

method: Subjective appraisal and discussions

of: Working prototype model

7.18.30 Design Studio: the Designer examined the drawings and decided to have a block wooden model made up by the Modelmaker. He telephoned the Modelmaker and discussed the project with him and made arrangements to go to the Modelmaker's studio. •

VISUAL ASSESSMENT 18.24

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: General arrangement drawings

7.18.31 Modelmaker's studio

People present:-

Industrial Designer

Modelmaker

The Modelmaker examined the engineering drawings and the cardboard model and recommended several detailed changes.

The Designer accepted these recommendations and the Modelmaker agreed to make the block model.

VISUAL ASSESSMENT 18.25

by: Industrial Designer + Modelmaker

in: Modelmaker's studio

method: Subjective appraisal and detailed discussions

of: Engineering drawings and cardboard model

7.18.32 Design Studio: the Designer considered the graphic details of the front control panel and made up a control panel drawing.

VISUAL ASSESSMENT 18.26

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design sketches

7.18.33 Modelmaker's Studio: same as previous meeting.

The Modelmaker showed the Designer the block model and the Designer said it was satisfactory.

VISUAL ASSESSMENT 18.27

by: Industrial Designer + Modelmaker  
in: Modelmaker's studio  
method: Subjective appraisal and verbal comment  
of: Block model

7.18.34 Company location meeting: same as previous Company meeting.

The Designer presented the block wooden model and the meeting expressed satisfaction with it. The Chief Engineer decided that they needed a fully finished appearance model and they would use this model as a data model for production and a selling model to the Company management. He examined then the drawing of the graphics for the control panel and made several alterations. The Designer undertook to make up a model and a full management meeting was arranged.

At the close of the meeting the Company Patent Officer's Assistant arrived and the Industrial Designer signed a set of design registration application forms.

VISUAL ASSESSMENT 18.28

by: Industrial Designer + 3 engineers  
in: Company office  
method: Subjective appraisal and verbal comment  
of: Design sketches and block model

7.18.35 Design Studio: the Designer examined the design in great detail and considered the making of an appearance model. The Designer telephoned the Modelmaker and made arrangements to visit him.

VISUAL ASSESSMENT 18.29

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design sketches and components

7.18.36 Modelmaker's Studio: same as previous Modelmaker's meeting.

The Modelmaker and the Industrial Designer discussed the details of making the model. The Industrial Designer undertook to provide finished artwork for the making of a silkscreen for the graphics and to provide several components for the model.

VISUAL ASSESSMENT 18.30

by: Industrial Designer + Modelmaker

in: Modelmaker's studio

method: Subjective appraisal and detailed discussions

of: Design sketches and components

7.18.37 Design Studio: the Designer re-designed the graphics for the control panel and telephoned the Chief Engineer about the components he required and about checking the graphics. The Chief Engineer said that an emergency had arisen in the Company and that he would have to devote him time to this emergency. However, they arranged to meet late on Sunday near the Company location and the Chief Engineer would bring the components.

7.18.38 Meeting at a public house

People present:-

Industrial Designer

Chief Engineer

Room:- Public bar

The Chief Engineer handed the Designer an envelope containing the components. The Industrial Designer checked

the contents of the envelope. The Chief Engineer examined the graphics and made several detailed changes.

**VISUAL ASSESSMENT 18.31**

by: Industrial Designer + engineer

in: Public house

method: Subjective appraisal and detailed discussions

of: Design sketches and components

7.18.39 Design Studio: the Industrial Designer drew up the artwork for the silk screen and telephoned the Modelmaker and a meeting was arranged.

**VISUAL ASSESSMENT 18.32**

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Artwork

7.18.40 Modelmaker's Studio: same as previous meeting at Modelmaker's.

The Designer gave the Modelmaker the artwork and components then they discussed the progress of the model. Arrangements were made for the Designer to collect the model.

**VISUAL ASSESSMENT 18.33**

by: Industrial Designer + Modelmaker

in: Modelmaker's studio

method: Subjective appraisal and discussions

of: Artwork and components

7.18.41 Modelmaker's Studio: same as previous meeting. The Modelmaker presented the model and the Industrial Designer accepted it.

VISUAL ASSESSMENT 18.34

by: Industrial Designer + Modelmaker

in: Modelmakers studio

method: Subjective appraisal and verbal comment

of: Finished appearance model

7.18.42 Company location meeting

People present:-

Industrial Designer

Industrial Designer's Associate

Chief Engineer

Room:- Chief Engineer's office

The Industrial Designer presented the model and the Chief Engineer expressed his delight. They called together a meeting in the Division Manager's office.

VISUAL ASSESSMENT 18.35

by: Industrial Designer + 1 associate + 1 engineer

in: Company office

method: Subjective appraisal and verbal comment

of: Finished appearance model

7.18.43 Meeting in Division Manager's office.

People present:-

Industrial Designer

Industrial Design Associate

Chief Engineer

Division Manager

Marketing Manager

Sales Manager

Production Manager

The Chief Engineer presented the model and the meeting expressed delight. 'It was right', said the Division Manager and ordered production to start. He also ordered the sales promotion to start based on the appearance model. Production details were discussed. The Division Manager thanked the Industrial Designer for all his efforts.

VISUAL ASSESSMENT 18.36

by: Industrial Designer + 1 associate + 2 engineers  
+ 2 marketing men + 1 manager

in: Company office

method: Subjective appraisal and verbal comment

of: Finished appearance model



## 7.19 Company C : Product Datel Modem

Background: the Company was considering tendering for a contract for the supply of a Datel Modem. The Industrial Design Team had previously been employed by the Company.

### 7.19.1 Company location meeting

People present:-

Industrial Designer

Chief Engineer

Senior Engineer Mechanical Design

Room:- Chief Engineer's office, side windows, conference table.

Chief Engineer explained that the Division was considering tendering for the product and would like to call in some industrial design expertise from the start. He wanted to know if the Industrial Designer could undertake the preliminary appearance work and later on allocate large periods of time to intensive work with his engineers on the tender application. The Designer said that this was possible and was given some preliminary overall appearance dimensions to consider.

7.19.2 Design Studio: the Designer examined the problem and noted the variables involved. Matrices were drawn up to these variables. It was decided to build an appearance model based on a number of these variables to give the engineers some idea of the appearance and shape they would be working with.

#### VISUAL ASSESSMENT 19.1

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Design sketches

Subsequently the model was built and the Chief Engineer invited to the design studio to examine it.

VISUAL ASSESSMENT 19.2

by: Industrial Designer

in: Design studio

method: Subjective appraisal

of: Appearance model

7.19.3 The Chief Engineer came to examine the model and stated that he liked the appearance of it. Unfortunately, he said, the tender specification had been re-interpreted and the appearance model no longer met the requirements. As the timetable was also being changed the Chief Engineer undertook to contact the Designer when he was next required.

VISUAL ASSESSMENT 19.3

by: Industrial Designer + 1 engineer

in: Design studio

method: Subjective appraisal and verbal discussions

of: Appearance model

7.19.4 Some considerable time later, when the Industrial Designer was heavily involved in other projects, the Chief Engineer telephoned to request his assistance. The Industrial Designer had to explain that he had now re-allocated his time and was no longer available. However, he offered the services of his associates for the project. The Chief Engineer accepted this offer and another Industrial Designer took over the project.

## 7.20 Company E : Product LEDs/Alpha Numeric

Background: the Industrial Design Team had already been employed by the Company on the development of numerics for light emitting display units.

### 7.20.1 Company location meeting

People present:-

Industrial Designer

Industrial Designer's Associate

Research Manager

Room:- Research Manager's office, side windows, conference table.

The Research Manager outlined his need to develop simulations of the advancing trends in alpha numeric LED displays, to cover various sizes, colours and large amounts of displays, various existing LED lash-up displays were shown to the Designers and discussed. The Designer undertook to develop his thinking and produce some simulations, and a presentation technique.

#### VISUAL ASSESSMENT 20.1

by: Industrial Designer + 1 associate + 1 manager

in: Company office

method: Subjective appraisal and detailed discussions

of: Sketches and existing prototypes

7.20.2 Design Studio: the Designers discussed the problem and wrote a brief that covered a list of the Research Manager's requirements. This was posted to the Research Manager. In his reply the brief had been slightly altered by the Research Manager.

7.20.3 Design Studio: receiving the brief the Designers drew up matrices to cover the problems and developed various presentation techniques. Two sets of presentation contents were decided upon, (colour X content) and (size X content).

VISUAL ASSESSMENT 20.2

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Design sketches

A number of presentations were constructed and a meeting arranged over the telephone.

VISUAL ASSESSMENT 20.3

by: Industrial Designer  
in: Design studio  
method: Subjective appraisal  
of: Constructed displays

7.20.4 Company location meeting, same as previous location meeting.

The Industrial Designer presented the work to the Research Manager, who showed great excitement over it and called in an engineer. The Engineer spent all his time asking about costs. The Manager undertook to think about the work and to let the Designers know his thoughts.

VISUAL ASSESSMENT 20.4

by: Industrial Designer + 1 associate + 1 engineer  
+ 1 manager  
in: Company office  
method: Subjective appraisal and discussions  
of: Constructed displays

7.20.5 Note: There has been no further contact with the Company on this subject, and it is believed that development funds for this type of activity have dried up.

## 8. DESK DATA

The desk data has been collected from published information and is used to support the field data.

## 8.1 On Designers in Industry

8.1.1 Industrial Designers are employed by Industry either as staff designers or as consultant designers. They operate as either one man operations or group operations. This gives us four main groupings for designers in Industry:

1. Single staff employment
2. Group staff employment
3. Single consultant employment
4. Group consultant employment (Fig. 5)

8.1.2 Potter (Ref. 5) divides Industrial Designers into five main groups:

1. Impresarios, those who get work, organise others to do it, and present the outcome.
2. Culture Diffusers, those who do competent work effectively over a broad field.
3. Culture Generators, obsessive characters who work in back rooms and produce ideas.
4. Assistants, often beginners but also a large group concerned with administration or draughtsmanship.
5. Parasites, those who skim off the cream of other people's work and make a good living by it.

It should be added that any designer might shift from one role to another in the course of his working life, or even during the course of a single commission. Potter offers no value judgment on these categories - except upon parasites, who he states are, alas, only too numerous (Fig. 6).

8.1.3 The product Industrial Designer will be dealing in Industry with:

1. Consumer Products, which will have an emphasis on the appearance of the product.
2. Engineering Products, which will have an emphasis on the performance of the product (Fig. 5).

8.1.4 The Industrial personnel that the designer will be dealing with will be in three main groups.

1. Engineering, who will be concerned with the making and the performance of the product.

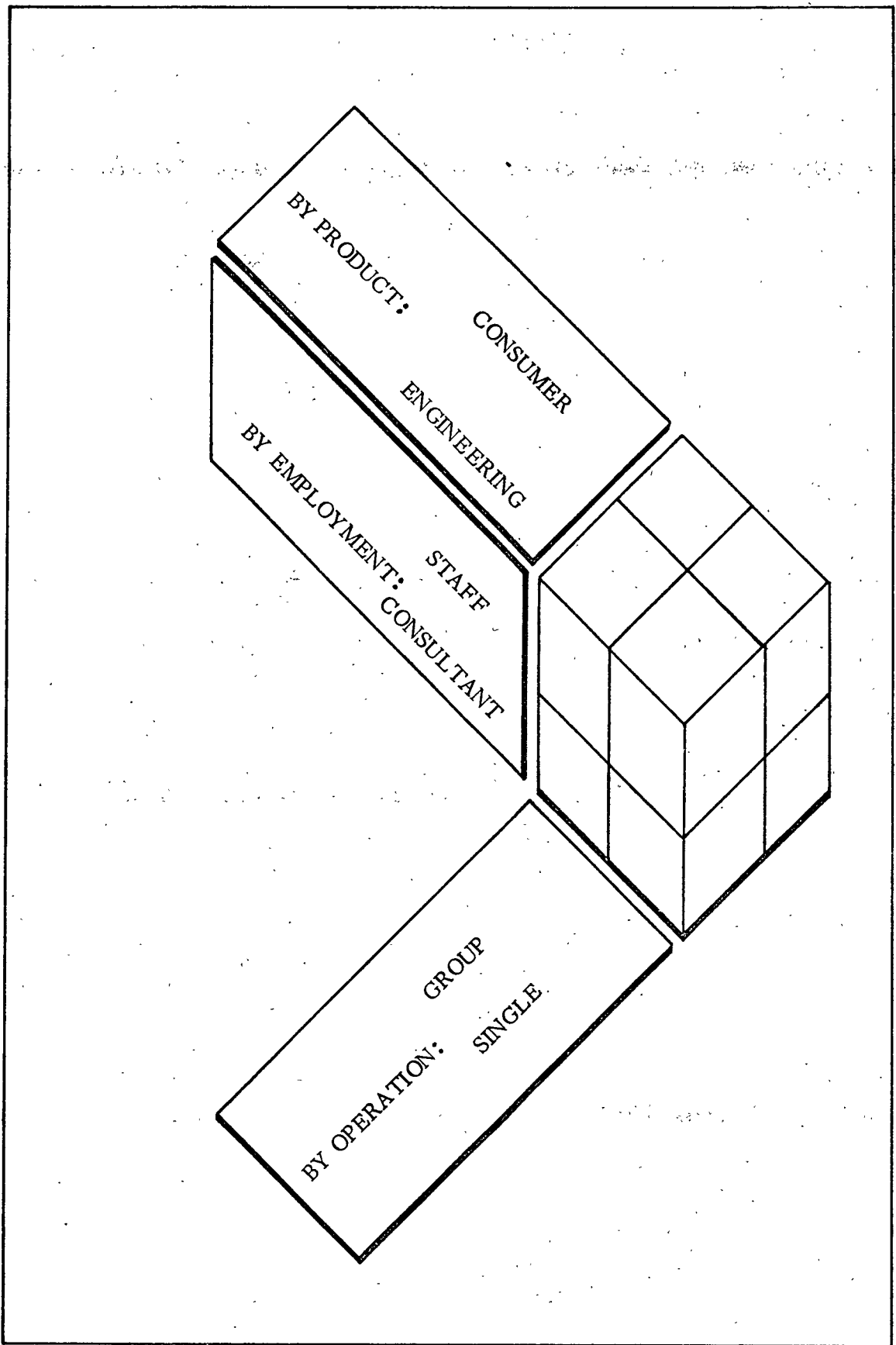


Fig. 5 Diagram illustrating the matrix for designers by employment, operating and products.



2. Marketing, who will be concerned with the selling and promotion of the product.
3. Management, who will be concerned with overseeing the progress of the product.

8.1.5 The practice of an Industrial Designer Consultant has been referred to in print. These are from the Consultant Industrial Designer's viewpoint (Ref.6), and from the viewpoint of employers of consultants (Ref.7). Henry Dreyfuss has related the history of his design consultancy, (Ref. 8) and Mayall has discussed how to use Industrial Design Consultants (Ref. 9).

#### 8.1.6 Using a case study approach.

Michael Farr has used case histories to list how the design progress should be managed from a consultant viewpoint (Ref. 10) and J. Noel White has related case histories from the viewpoint of employer's and design management (Ref. 7). During a conference for management consultants and Industrial Designers at the Royal Society of Arts (Ref. 11), case histories were reported, to illustrate the practice of Industrial Design.

In one case study reported (Ref. 12) on the development of high speed photography cameras, the product had been finished 'except the coat of paint' before a local industrial design consultant was brought in.

L. Bruce Archer used case histories to illustrate the use of his check list of the embodiment of a hypothesis of the structure of the Design Act (Ref. 13).

A case study from the practice of Henry Dreyfuss has been reported to illustrate a group practice in Product Design (Ref. 14).

Three case studies have been reported to illustrate costings for design work from design consultants (Ref. 15).

8.1.7 The author has examined the reporting of the above-mentioned case studies in Industrial Design.

Regretfully the reportage is not given in great detail.

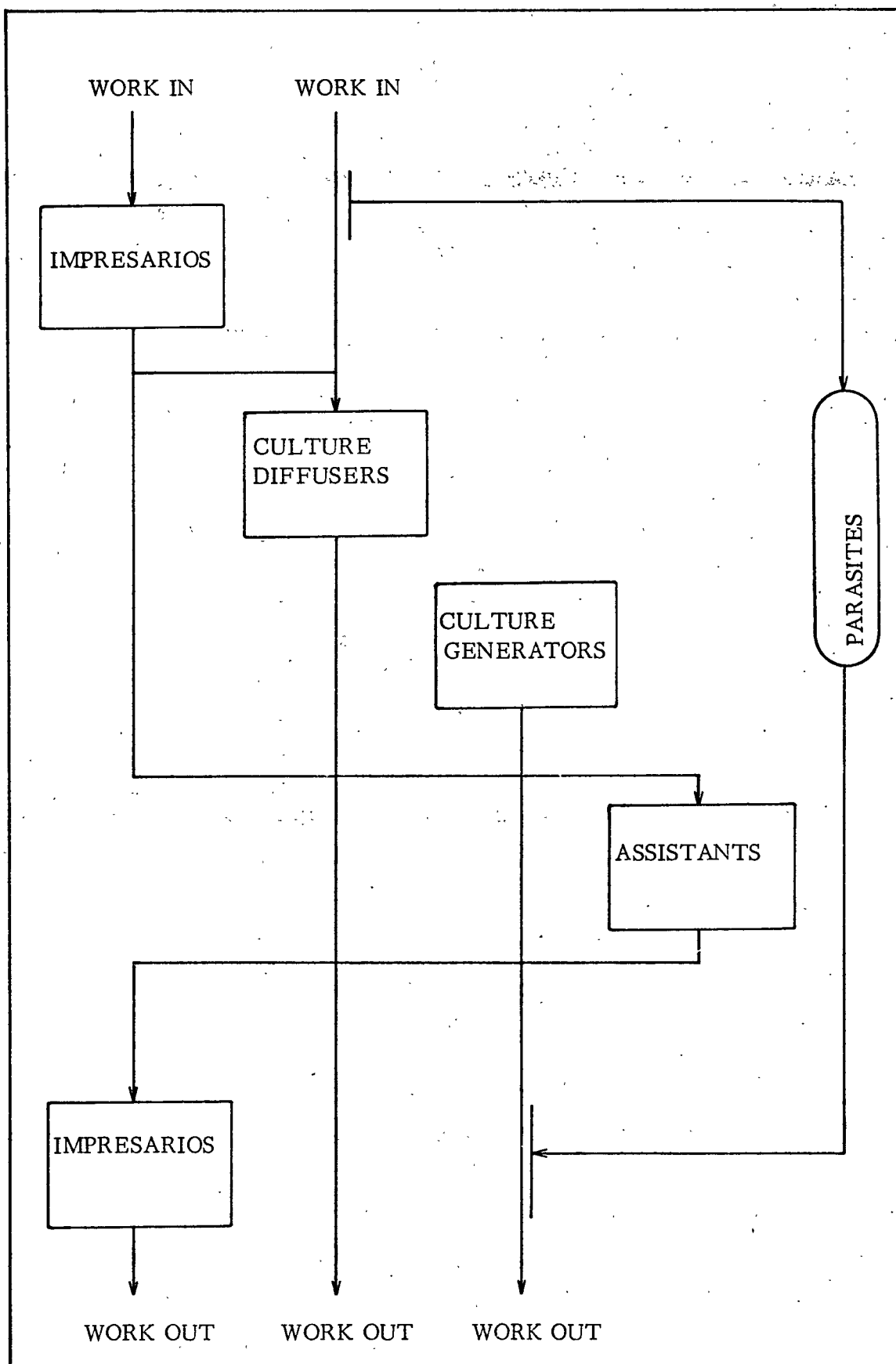


Fig. 6 Diagram illustrating Potter's grouping of diagrams (Ref. 5).

## 8.2 On the Design Process

8.2.1 There are numerous methods to describe the design process. Love lists a comparison of four systematic design methods (Ref. 16).

Woodson lists a comparison of nine problem solving processes (Ref. 17) and Hykin examines engineering design methods in theory and in practice through a case study approach (Ref. 2). Baynes has illustrated a diagram of the design process as understood by a London schoolboy (Ref. 18) (Fig. 7). Hill lists a comparison of the scientific method and the design method (Ref. 19) (Fig. 8) and Archer (Ref. 13) illustrates the main phases of design (Fig. 9).

8.2.2 Dreyfuss illustrates eight fundamental steps between the drawing board and assembly line for the Singer Model 600 sewing machine (Ref. 8) (Fig. 10).

### 1. Study competition

Analyse models and illustrations

### 2. Familiarise oneself with the client's manufacturing facilities.

### 3. Learn how the product will be used.

### 4. After consultation with senior management, sales executives and engineers, develop a variety of idea sketches.

### 5. Study the design in three dimensions with rough clay model.

### 6. Ergonomic assessment.

### 7. Close collaboration with client's engineers. Working drawings made and checked against their pilot model.

### 8. Prototype model, identical to production model.

8.2.3 Any total design process can be divided into three main phases, a beginning, a middle and an end, with a pre-design phase, and a post-design phase. We may also compare these three phases to divergent, motoring and convergent activity.

There are two other phases that the Consultant Industrial Designer will be concerned about.

### 1. Before the pre-design phase, how the company contacts

the Consultant Industrial Designer.

2. After the post-design phase, will the company continue to employ the Consultant Industrial Designer (Fig. 11).

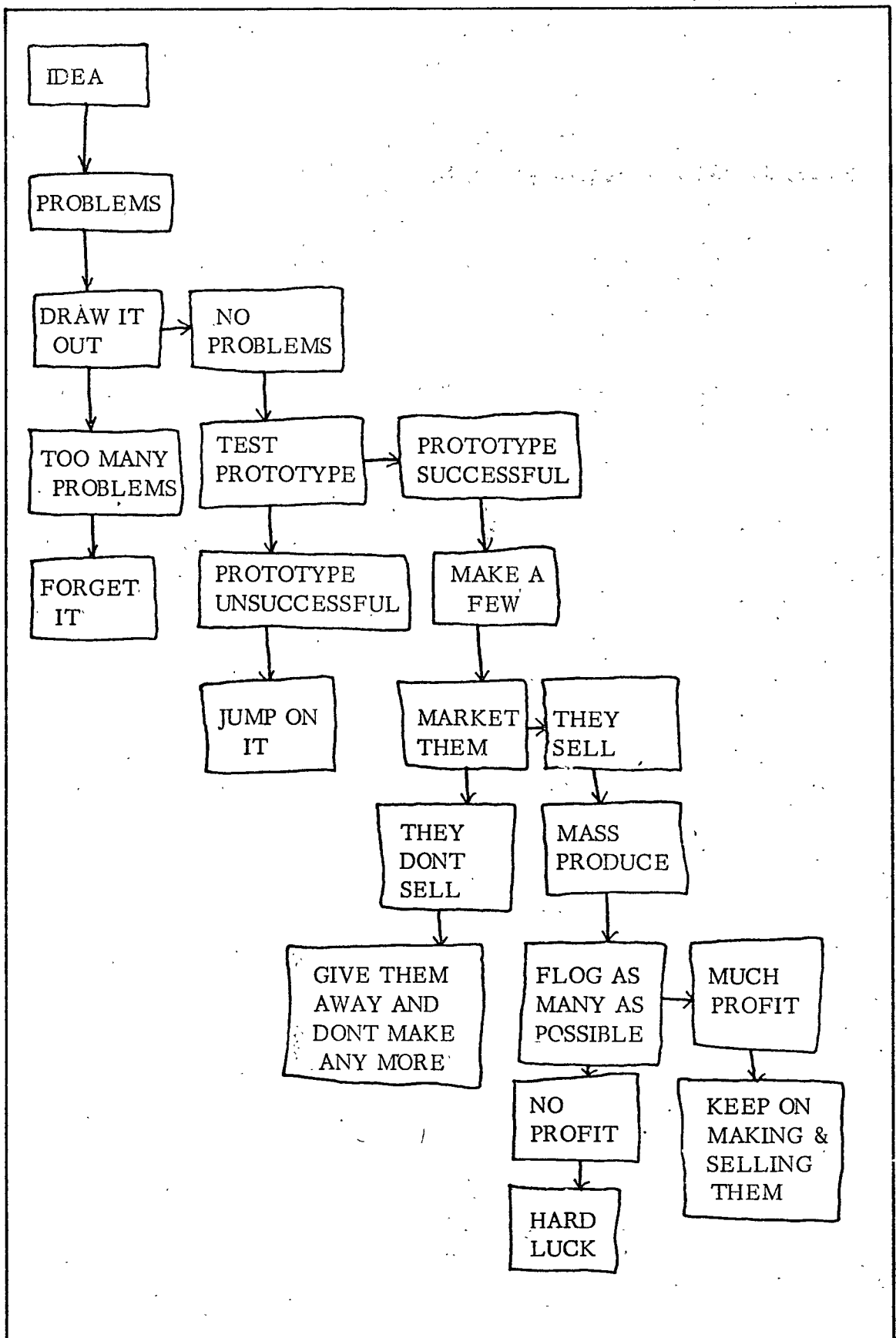


Fig. 7 Diagram of the design process by a London schoolboy, from 'Attitudes in Design Education' by Ken Baynes (Ref, 18).

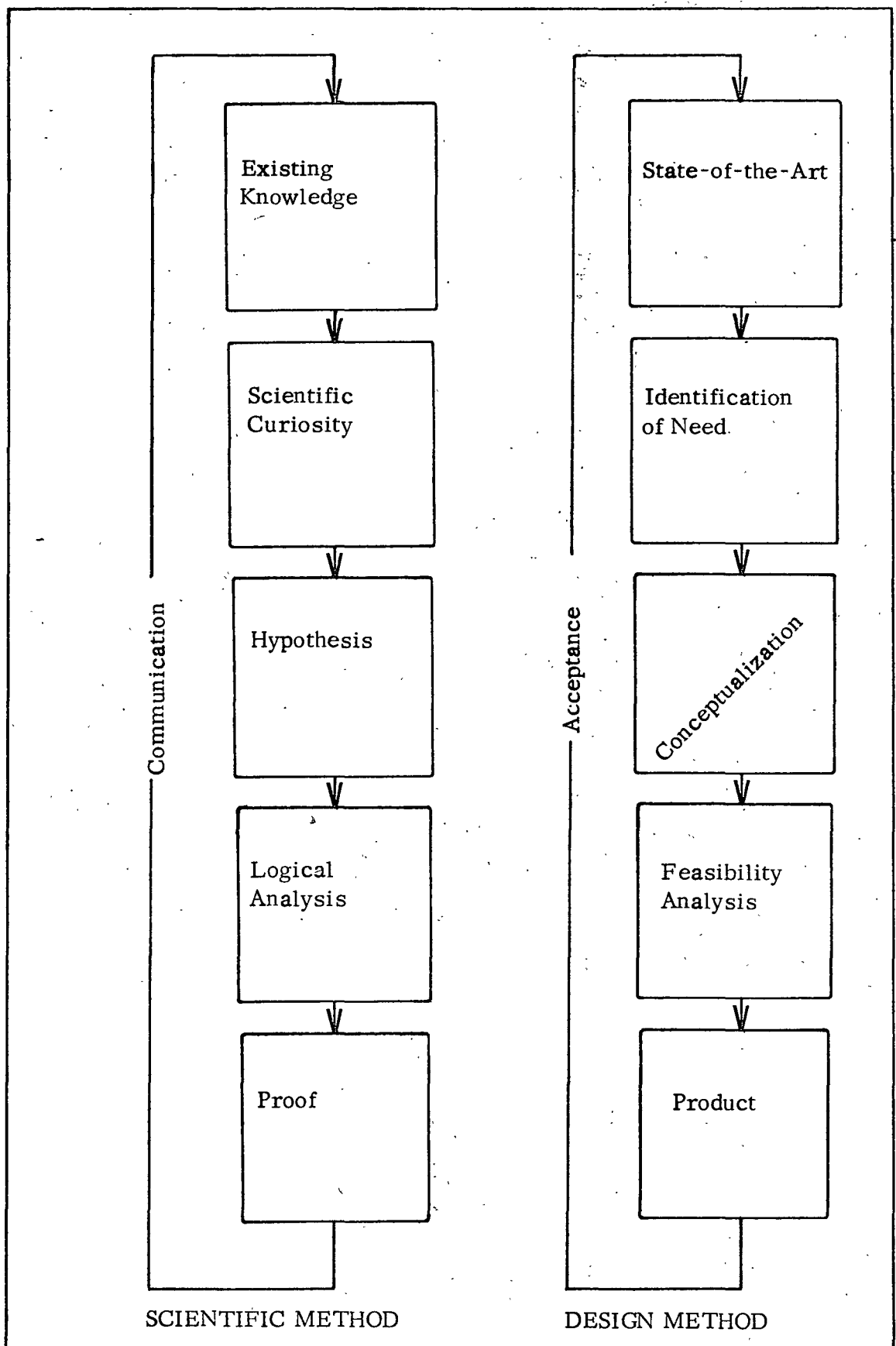


Fig. 8 Diagram of Hill's comparison of the Scientific Method and the Design Method (Ref. 19).

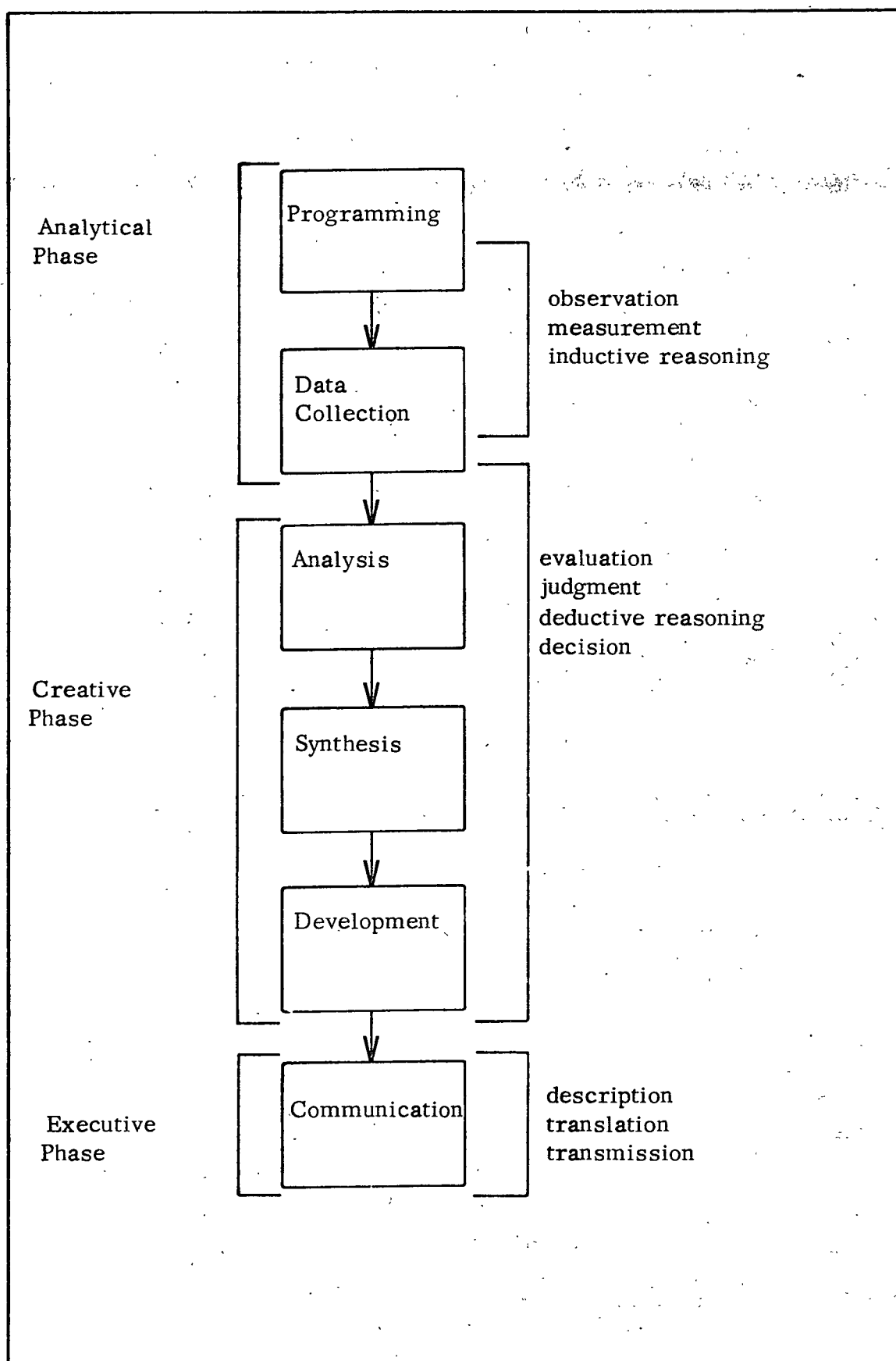


Fig. 9 Diagram of the main phases of design from Archer (Ref. 13).

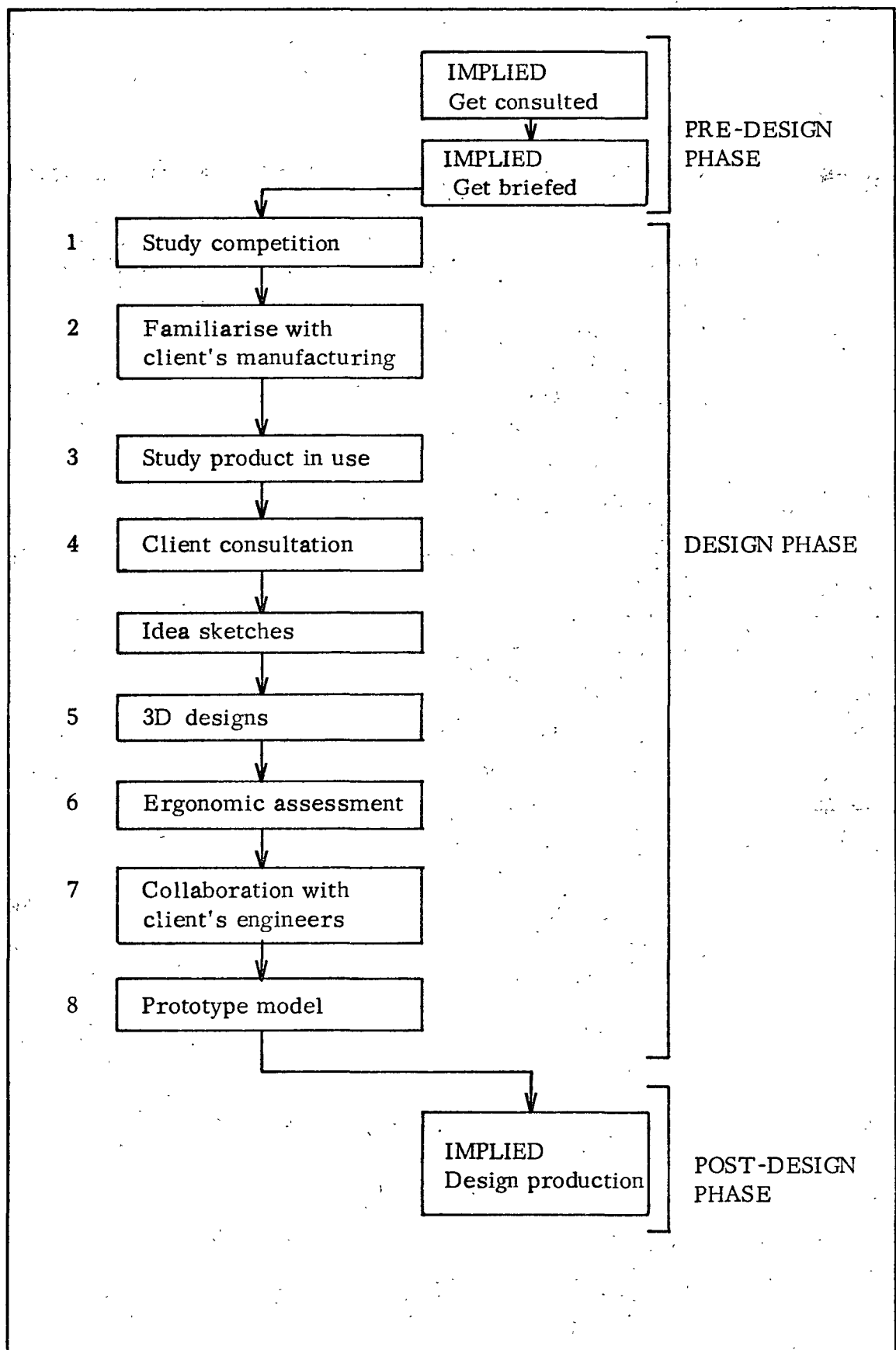


Fig. 10 Diagram of Dreyfuss' eight fundamental steps for the sewing machine design (See 8.2.2).



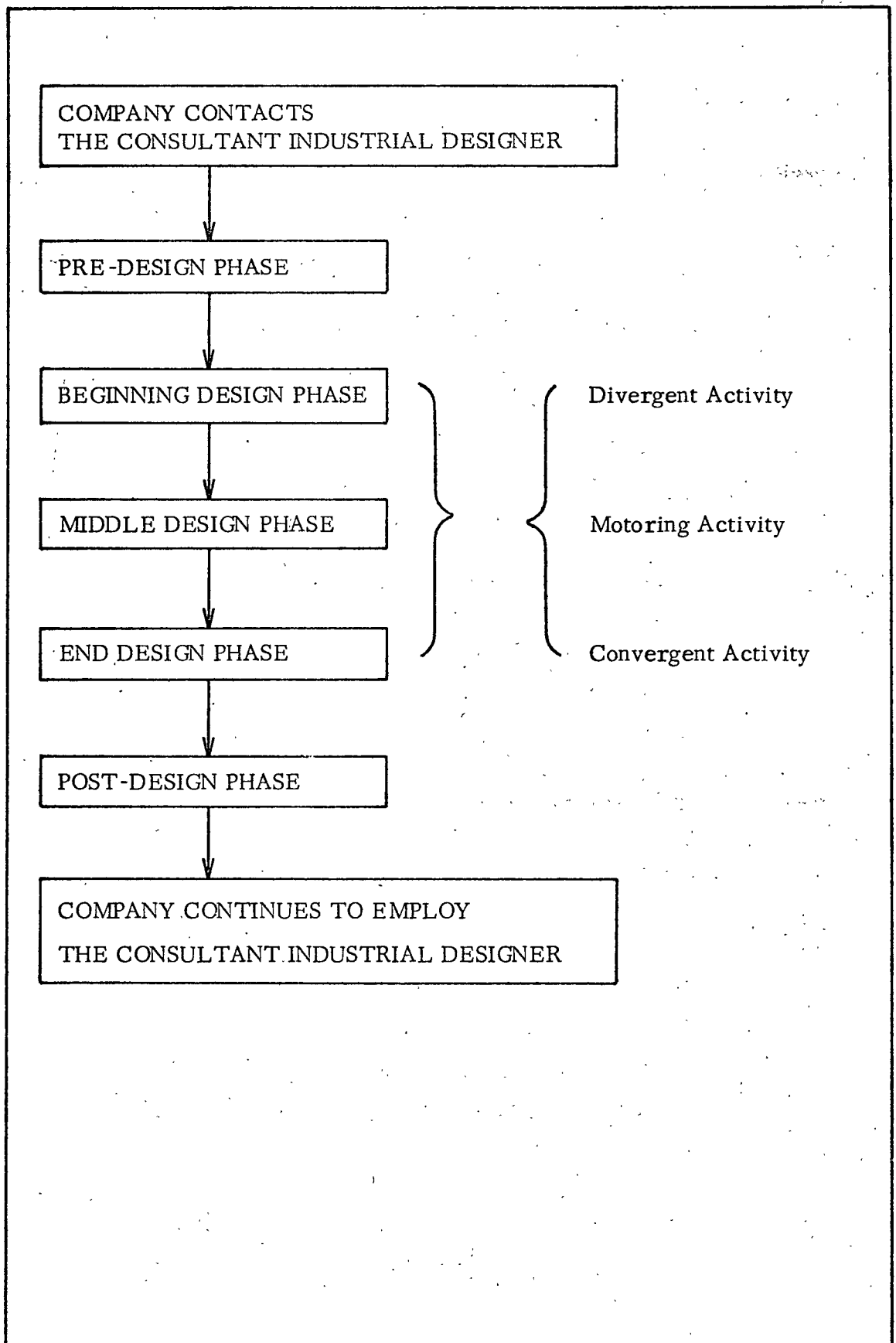


Fig. 11 Diagram of the Consultant Industrial Designer's design process.

### 8.3 On Techniques of Visualisation

8.3.1 Ashford (Ref. 6) lists a progression of visualisations as:

1. Sketches:

Rough doodling of pencil on paper

Rough visualisation sketch of lead pencil on paper

Rough visualisation sketch of chalk on tinted paper

Diagrams

Mechanical diagrams, illusion sketches using chalks

2. Renderings:

Based on accurate perspective drawing, that must give an illusion of the object, to be used for assessing the G.A. drawing.

3. Engineering drawing:

General arrangement drawing, not cluttered with information.

4. Models:

The simple progress or study model.

The highly finished but non-working presentation model.

The fully working prototype.

8.3.2 Mayall (Ref. 9) discusses presentation in terms of pictorial drawings, preferably in colour, and models and of the 'illusioned' Engineering Drawing that is dimensionally correct, apropos an optically deceiving presentation drawing that he finds inexcusable.

8.3.3 Potter (Ref. 5) discusses drawings and models for designers. With drawings he lists:

Diagrams which are abstract, partial, energetic, concerned to establish or convey ideas and values directly, thus having an analytical or interpretive purpose. Usually have open conventions (excepting graphs and mathematical conventions), may be imprecise, or may be examining exact quantities, usually have diagnostic function.

Illustrations which are depictive, present appearances from which inferences may be drawing, are often atmospheric in nature and persuasive in purpose, have closed conventions. Usually have prescriptive function; better for presenting conclusions than determining them.

Surveys which are records of measured and verifiable fact reduced to quantities, though survey drawings may be accompanied by interpretive notes. Closed conventions. Diagnostic function.

Working Drawings which are strictly purposeful and are instructions. Use rigid but propulsive conventions (i.e. lead to required action). Many types according to purpose, occasion and recipient. Prescriptive function.

8.3.4 In a case study by Henry Dreyfuss and his team in designing a new range of tractors, the following visualisations were progressively produced (Ref. 14):

1.  $\frac{1}{4}$  scale sketches
2.  $\frac{1}{4}$  scale sketch model, including essential engineering volumes.
3. Ergonomic design of seating including full scale seating mock-up.
4. Full sized air brush designs (flat drawing elevations only).
5.  $\frac{1}{4}$  scale model ingeniously photographed to give an illustration of true size in a true environment.
6. Full size mock-ups of doubtful areas constructed sometimes to save costs and time, a mirrored half model.
7.  $\frac{1}{4}$  scale finished models.
8. Full size clay model
9. Fibreglass moulds taken to be shipped to factory for use on working prototypes.
10. Detailed design and modelling of components.
11. Full size appearance mock-up.

8.3.5 Van Doren (Ref. 20) lists a design progression of visualisations.

1. Rough visualisation, 3-dimensional sketch drawings showing illustration of the design.
2. Renderings, defined as a carefully finished drawing representing a photographic illusion of the design.
3. Clay studies, full-sized models made in clay.
4. Scale models, made in a material susceptible to a better surface finish than clay.
5. Mock-ups, full scale model that has the fully finished illusion of the finished product.

6. Prototypes, full size model exact in every detail inside and out in production materials and finishes.
7. Mechanical drawings.

He illustrates this progression by showing pictures of the progress of a design in a capital goods area, a 4-pocket dough divider. He illustrates:

1. the existing machine in use
2. the existing machine at rest
3. first life scales
4. a studio model
5. a first rendering
6. an oversimplified rendering
7. a more detailed rendering
8. a plaster presentation model
9. a clay modified model
10. final design

He also discussed consumer surveys and hall tests as a means of getting consumer reaction to a proposed design.

8.3.6 Archer (Ref. 13) lists the range of means by which a design idea may be expressed (Fig. 12).

8.3.7 Hill (Ref. 29) discusses Functional Visualisation, which involves picturing the function to be accomplished, devising methods of achieving the function, then assembling the hardware necessary to support these methods, and involves the use of Idea Diagrams, with Idea Matrices, and conceptual sketches (Fig. 13).

8.3.8 Woodson (Ref. 17) discusses three types of models:-

1. Iconic, where the model specifically looks like the original.
2. Analog, where the model specifically behaves like the original.
3. Symbolic, where the mode abstractly represents the principle of the original (Fig. 14).

TYPE OF ANALOG	EXAMPLES
1. A form of words	evocative words definitive statements patent specifications
2. Symbolic logic	Boolean algebra mathematical models
3. Diagrams	flow diagrams circuit diagrams vector diagrams
4. Sketches	evocative sketches definitive sketches
5. Formal drawings	perspective renderings scale drawings
6. Simple models	block models space models scale models
7. Working analogs	electrical analogs rigs photoelastic models
8. Prototype	

Fig. 12 Diagram of Archer's list of the range of means by which a design idea may be expressed (Ref. 13).

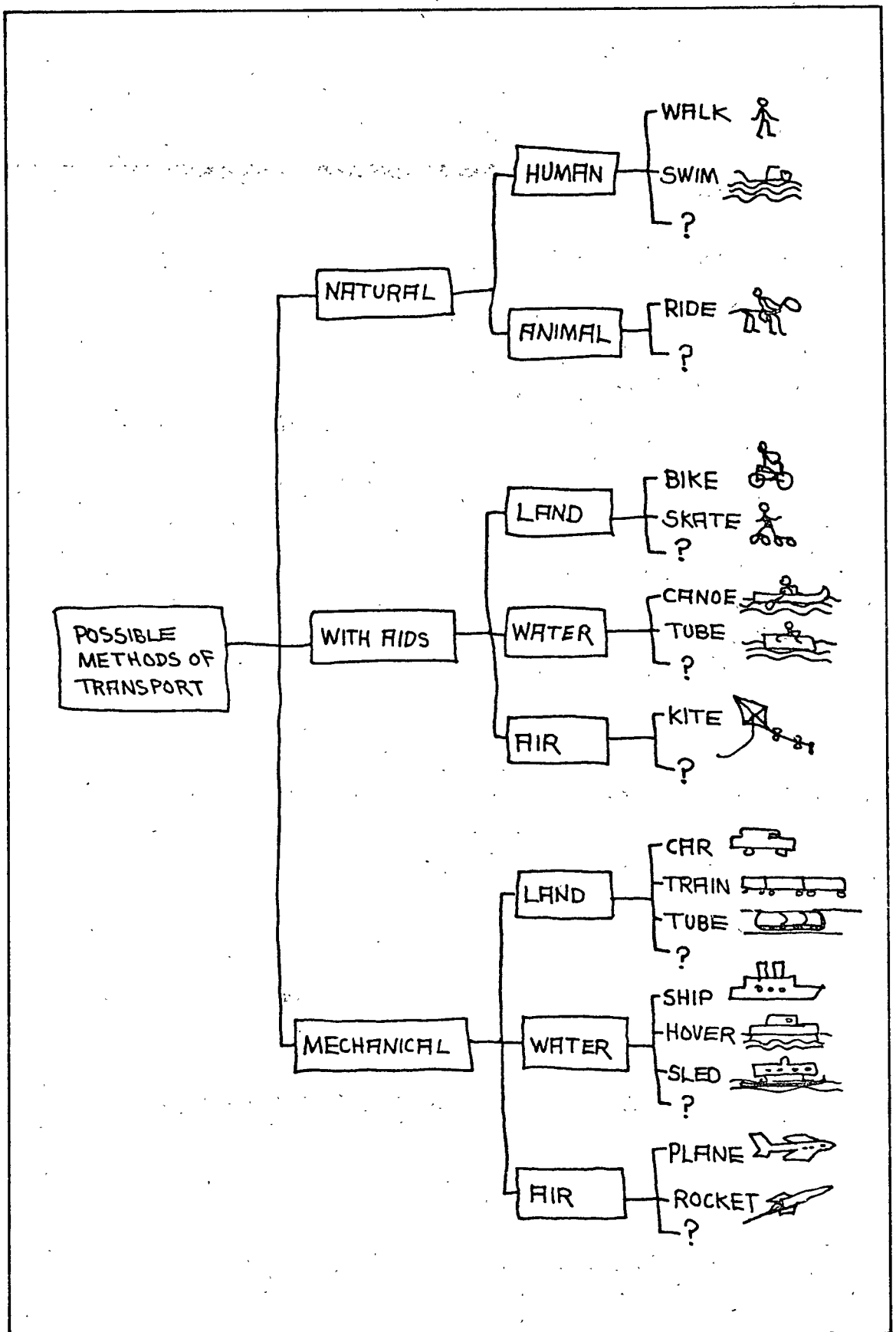
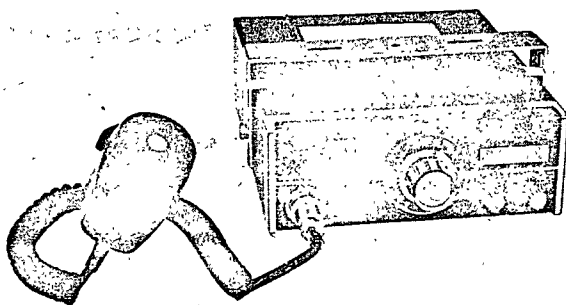


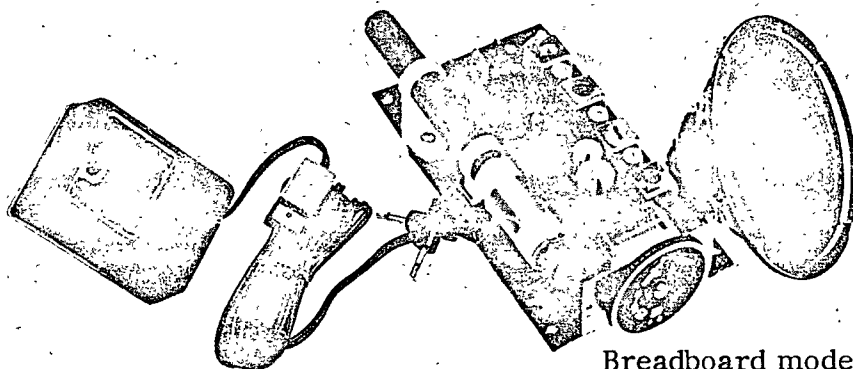
Fig. 13 Typical Idea Diagram from Hill's Functional Visualisation (Ref. 19).

ICONIC MODEL:  
'specifically looks like the original'



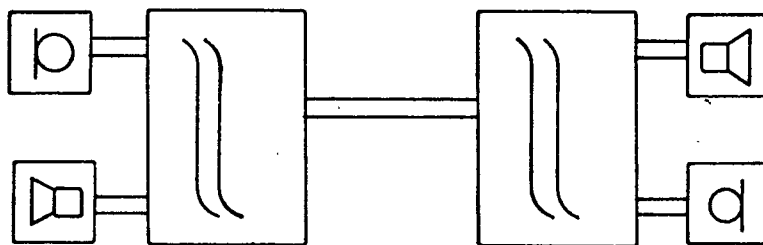
Appearance model

ANALOG MODEL:  
'specifically behaves like the original'



Breadboard model

SYMBOLIC MODEL:  
'abstractly represents the principle of the original'



Block diagram

Fig. 14 Diagrams illustrating Woodson's three model types (Ref. 17).

## 8.4 On techniques of Presentation

8.4.1 Van Doren (Ref. 20) discusses presentation of designs to the client and lists three rules for presentation.

1. Be clear
2. Be comprehensive
3. Be brief

He discusses four types of presentation.

1. Research and analysis
2. Preliminary sketches
3. Renderings
4. Mock-ups and prototypes

He further discusses presentation to a full dress group of executives or to small groups of the product manager, a number of engineers and factory men. He recommends that it is good policy to show two or three design solutions and let the client exercise his prerogative of making a choice and discussing it with him. He states that to show one solution and to insist that this is the only possible answer smacks of omniscience and it may offend the client. He also discussed the likelihood of the client or designer missing out information and aspects of the design development which lead to confusing and exasperating situations as the work progresses. Situations where the production manager takes over the presentation of his design to executives of the client's organisation are also discussed as is presentation in assembly rooms or auditoria as opposed to presentations in a director's board room or permanent display room. He recommends bringing one's own floodlighting and previous design developments to counter awkward situations and recommends keeping gatherings as small as possible. He discusses a case of long drawn out meetings where those attending were constantly being called away on other Company business and had then to be brought up-to-date.

He discusses human nature, personality clashes, company politics and humorous interludes. He contends that Marketing think in terms of 'has it appeal for the customer' and Engineering 'how shall we make it' and the conflict that this leads to.



Media	Room Condition	Audience Size	Advantage	Disadvantage
Flip Charts	Lighted	10-15	Easily prepared. May be written on during presentation.	Difficult to use before large group. Difficult to transport.
Viewgraph	Lighted	10-30	Easily prepared. Easy to file and transport.	Difficult to achieve effective colour and a variety of art work.
Lantern Slides	Darkened	20-60	Colour and art work easy to achieve. Easy to file and transport.	Time consuming to prepare. Must be shown in a darkened room.
Movie Projector	Darkened	20-60	A highly sophisticated presentation can be made. Is usually impressive.	Expensive. Presenter does not take an active role. Too permanent.
Mock-up	Lighted	5-10	Shows workings and function of parts. Easy to visualize.	Difficult to show to a large group. Difficult to transport.

Fig. 15 Diagram of Hill's visual display media (Ref. 19).

He recommends never to apologise for the design.

8.4.2 Farr, (Ref. 21) discusses the presentation of the design solution to senior executives.

He elucidates on how the meeting should be a formal affair and gives an example of a proposed agenda sheet.

He further recommends that a presentation meeting should run in a straightforward unpretentious manner; that the design manager should sit opposite the chairman so that they can exchange 'eye clues' and that the new design model should not be displayed until the appropriate time so as not to distract the meeting.

8.4.3 Hill, (Ref. 29) discusses how to sell ideas by planning and preparing a presentation. He lists the following rules for planning and giving a presentation.

1. Know the design solution well and show enthusiasm for it.
2. Point out its advantages as well as its disadvantages.
3. Be prepared to accept criticism but at the same time stand up for the original concept.
4. Arrange the format in a manner that will make it easy for an aide to project illustrations and photographs.
5. Construct a set of prompter cards (index size).
6. Start on time, break on time, stop on time.
7. Keep firm control during the critical examination period but do not be a dictator.
8. The most important part of any critique is the selling and defending of your ideas.

He lists visual display media as shown in the table (Fig. 15).

He also suggests the following check list for meetings:

1. Sufficient chairs available and seating arrangement checked.
2. Display material available.
3. Chalk and eraser available for chalkboard.
4. Projection equipment and screen available (including spare bulbs).
5. Trained projectionist available.

6. Arrangements made for coffee breaks.
7. Pencils and paper available for note-taking.
8. Person assigned to take minutes.
9. Ash trays available.
10. Podium, pointers, public-address system available if needed.

## 8.5 On Techniques of Assessment.

8.5.1 Bishop (Ref. 22) lists evaluation techniques as (Fig. 16):

1. Battleaxe, dividing ideas by inspection into four groups as:
  - a. Rubbish - throw away
  - b. Well known - don't forget
  - c. Possible - store
  - d. That's it - develop further
2. T-chart, giving Good or Bad ratings to each characteristic.
3. Decision Matrix, apportioning numerical values for each alternative to desired objectives and using the sums to show the best alternatives (Fig.17).
4. Decision trees (Fig. 18).
5. Optimisation a mathematical approach

8.5.2 Jones (Ref. 23) lists methods of evaluation or convergence as:

1. Checklists, to enable designers to use knowledge of requirements that have been found to be relevant in similar situations.
2. Selection criteria, to decide how an acceptable design is to be recognised.
3. Ranking and weighting, to compare a set of alternative designs using a common scale of measurement.
4. Specification writing, to describe an acceptable outcome for designing that has yet to be done.
5. Quirk's Reliability Index, to enable inexperienced designers to identify unreliability components without testing.

8.5.3 Woodson (Ref. 17) discusses assessment in terms of decisions of optimisation, he lists:-

1. Optimisation as a selection process using all types of quantitative and qualitative criteria.
2. Trade-off decisions; when desirable optimising objectives conflict with other objectives.
3. Optimising procedures; in guises of subjective,

graphical, analytical, algorithmic and empirical.

8.5.4 Hill (Ref. 19) discusses assessment as:-

1. Optimisation; in terms of trade off, e.g. the best appearance at the lowest cost.
2. Subjective decisions; making the correct intuitive decision based on experience.
3. General principles; in terms of either certain facts that cannot be violated, or 'rules-of-thumb'.
4. Graphical methods, based on assessment of engineering drawings.
5. Analytical methods, based on mathematical questions.

Hill also discusses Decision Matrices, as a guide to making the best decision regarding alternatives against specified criteria.

8.5.5 Beakley & Chilton (Ref.24) discusses decision processes. They define a decision as 'the selection of one alternative from a known set of alternatives' and states three types of decisions.

1. Decisions made under certainty
2. Decisions made under risk
3. Decisions made under uncertainty

They qualify selection according to a 'principle of choice' and illustrate a 'General Decision Matrix' that is a matrix of 'controllable factors x uncontrollable factors' (Fig. 17).

8.5.6 Archer (Ref. 13) discusses in the art of synthesis how to evaluate designs, in terms of feasibility testing, he lists two main types:

1. Actual assessment i.e. to build a design and test it.
2. Paper assessment i.e. to calculate a design and evaluate it.

Archer also elucidates about:

1. Descriptive aesthetics, which deals with the empirical facts about perceivable qualities and the statistics of preferences.
2. Ethical aesthetics, which deals with good taste and bad taste, or appropriateness.

3. Case-law logic, as an essential feature of value judgment based on the consensus of informed opinion.

4. Appeal, using wine as an appeal object, he discusses the difference between:

i I like this,

ii I recognise that this conforms well to those criteria which are generally accepted to be the mark of good.

5. Intuition, he recommends that in the majority of cases it is far quicker and cheaper to handle the whole of the aesthetic side of design by intuition, provided that there is an adequate body of prior experience to base it upon.

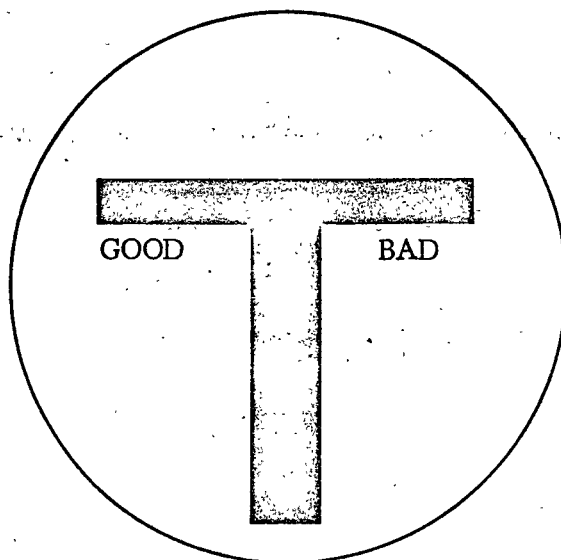
8.5.7 The Author would like to make some mention of objective visual assessment techniques as used by ergonomists. There are three main techniques that would be of use in assessing industrial, or wide stimuli situations, apropos clinical, or narrow stimuli situations.

1. Eye Observation Cameras, pupillography, (Ref. 1). Where cameras are used to record the expansion and dilation of the pupils in response to visual stimuli, correlations being drawn between pupil expansion and visual excitement, and pupil dilation and visual dullness.

2. Eye movement cameras, electro-oculography (Refs. 1, 25, 26 and 27), where the movements of the eyeballs are recorded by skin electrodes and the direction of gaze pinpointed.

3. Time lapse cameras (Ref. 25), where time lapse cameras film the movements of people over a period of time.

T CHART:



BATTLEAXE:

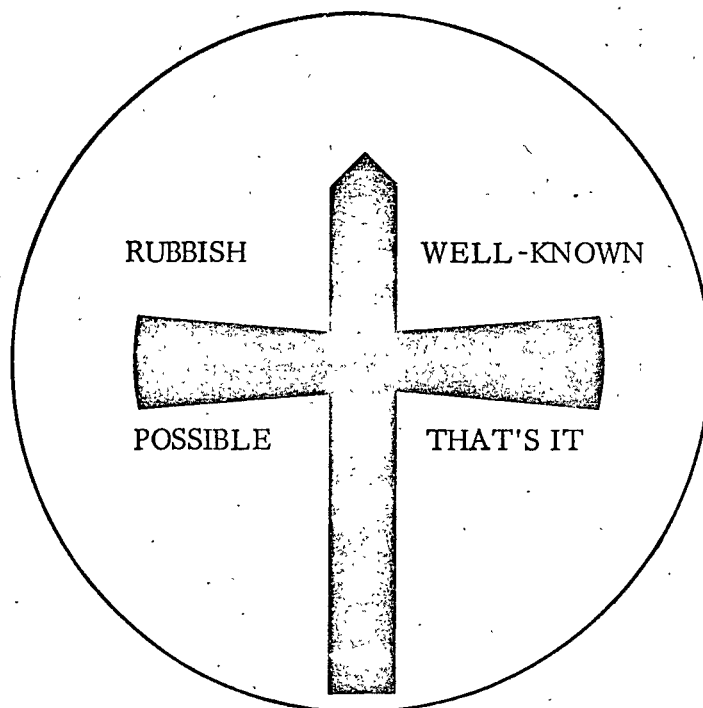


Fig. 16 Diagrams of Battleaxe and T chart from Bishop (Ref. 22).

		POSSIBLE FUTURE STATES ( Uncontrollable Factors )						
		$S_1$	$S_2$	$S_3$	"	$S_i$	"	$S_n$
AVAILABLE ALTERNATIVES ( Controllable Factors )	$a_1$	$R_{1-1}$	$R_{1-2}$	$R_{1-3}$	"	$R_{1-i}$	"	$R_{1-n}$
	$a_2$	$R_{2-1}$	$R_{2-2}$	$R_{2-3}$	"	$R_{2-i}$	"	$R_{2-n}$
	$a_3$	$R_{3-1}$	$R_{3-2}$	$R_{3-3}$	"	$R_{3-i}$	"	$R_{3-n}$
	"	"	"	"	"	"	"	"
	$a_i$	$R_{i-1}$	$R_{i-2}$	$R_{i-3}$	"	$R_{i-i}$	"	$R_{i-n}$
	"	"	"	"	"	"	"	"
	$a_m$	$R_{m-1}$	$R_{m-2}$	$R_{m-3}$	"	$R_{m-i}$	"	$R_{m-n}$

Fig. 17 Diagram of a General Decision Matrix from Beakley & Chilton (Ref. 24).



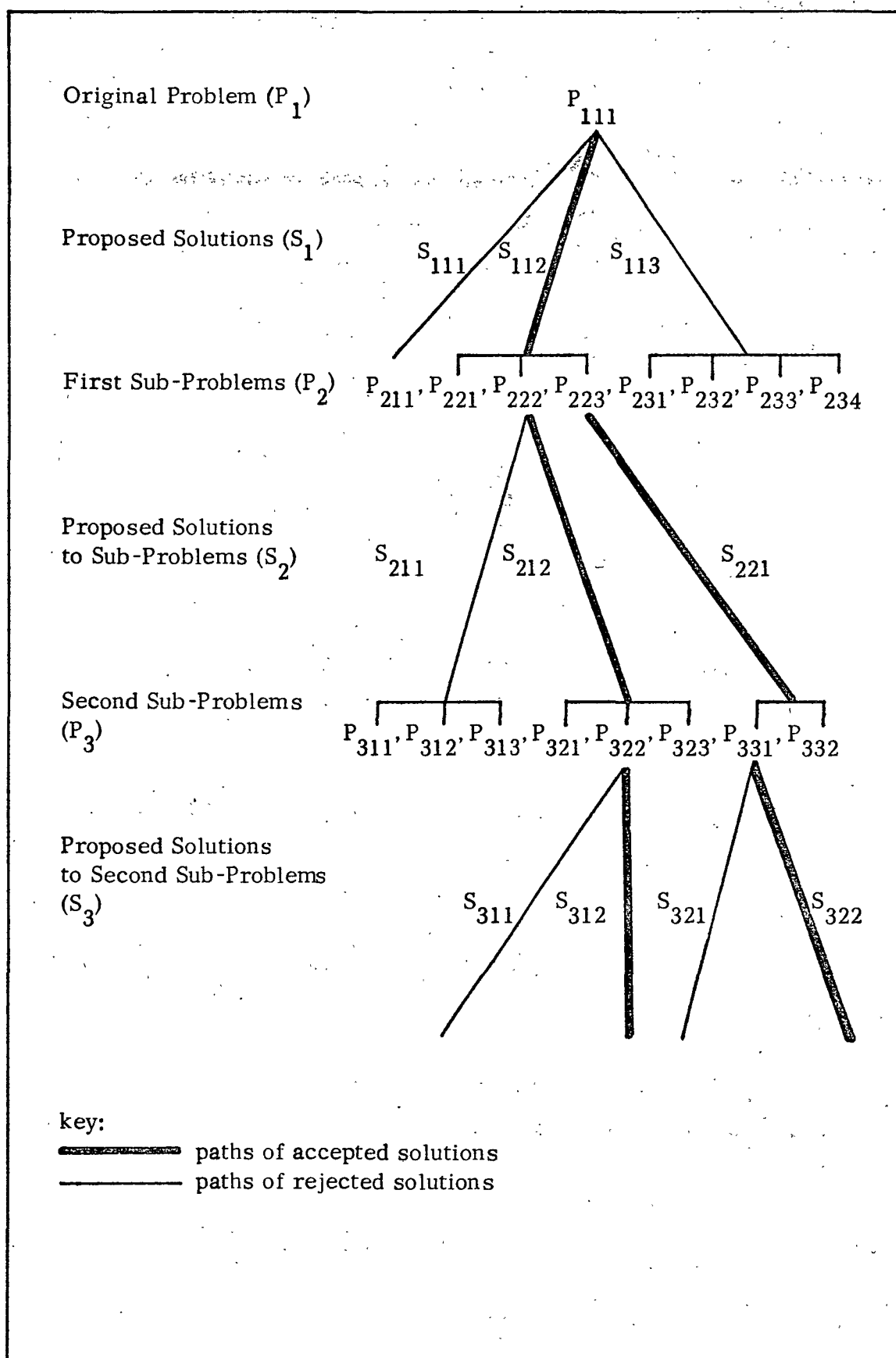


Fig. 18 Diagram of a decision tree by the author based on the work of Marples (Ref. 28).

## 9. ANALYSIS

### 9.1 General analysis of case studies

9.1.1 There are twenty case studies from six different companies recorded over a period of three years. Thirteen of the case studies are concerned with engineering electronic goods, and seven of the case studies with consumer electronic goods. In total 171 units of visual assessment are recorded (Fig. 19).

9.1.2 Where the products mentioned in the case studies are examined there is general scattering of industrial design aspects such as product, graphics, colour and shape (Fig. 20)

Case No.	Company A B C D E F						Engineering Goods	Consumer Goods	No. of Stages	No. of Visual Assessments
1	O							O	9	9
2	O							O	11	8
3	O							O	7	10
4		O					O		10	13
5			O				O		3	3
6			O				O		3	3
7				O			O		13	8
8			O				O		6	4
9					O		O		10	9
10					O		O		6	2
11	O							O	4	5
12				O			O		4	5
13						O	O		12	7
14			O				O		11	12
15	O							O	15	14
16	O							O	9	10
17	O							O	6	6
18				O			O		43	36
19				O			O		4	3
20					O		O		5	4
Totals	7	1	4	4	3	1	13	7	191	171

Fig. 19 Diagram for the general analysis of case studies

		Engineering or Consumer Goods	Aspects considered			
			Product	Graphics	Colour	Shape
1	Freezers	CG	O	O	O	O
2	Blenders	CG	O	O	O	O
3	TVs	CG	O	O	O	O
4	Amplifier	EG	O	O	O	O
5	Amplifier	EG	O	O	O	O
6	Linemans Box	EG	O	O	O	O
7	Powersupply	EG		O		
8	Temperature Controller	EG	O	O	O	O
9	LEDs Numeric	EG		O	O	
10	Loudspeaker	EG	O		O	O
11	Grill	CG	O	O	O	O
12	Metrix meter	EG	O	O	O	O
13	Ferrodot 10 x 7 A	EG		O		
14	Regenerator Unit	EG	O	O		O
15	Radios	CG	O	O	O	O
16	Unit Audios	CG	O	O	O	O
17	Loudspeaker	CG	O		O	O
18	Bench Power Supply	EG	O	O	O	O
19	Datel Modem	EG	O	O	O	O
20	LEDs Alpha Numeric	EG		O	O	

Fig. 20 Diagram for the general analysis of case studies

## 9.2 Design progression analysis of the case studies.

9.2.1 We can examine the design progression of the case studies in eight main stages (illustrated in Fig. 21):

1. Previous Association; whether or not the Company has consulted the Designer before.
2. Industrial Marketing; involvement before the product and brief are specified
3. Beginning of the Design Phase
4. Middle of the Design Phase
5. End of the Design Phase
6. Industrial Production, such as de-bugging
7. Industrial Marketing, such as promotion the product.
8. Continue to be Associated; whether or not the Company continue to consult the Designer.

	Case numbers:																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Previous association	■	■	■	■		■		■		■	■	■	■	■	■	■	■	■	■	■
2. Industrial marketing	■	■	■			■		■	■	■	■	■	■	■	■	■	■	■	■	■
3. Beginning design phase	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4. Middle design phase	■	■	■	■		■	■	■		■	■	■	■	■	■	■	■	■	■	■
5. End design phase	■	■	■	■					■		■	■	■	■	■	■	■	■	■	■
6. Industrial Production				■																
7. Industrial marketing																				
8. Continue to be associated	■	■	■	■				■	■	■	■	■	■	■	■	■	■	■	■	■

Fig. 21 Diagram of the design progression of the case studies.

### 9.3 Detailed analysis of the case studies

(For full detailed analysis see Appendix 12.2)

9.3.1 The subject of the visual assessments in the case studies may be summarised as:-

1. 2 and 3 dimensional information
  2. 2 and 3 dimensional ideas
  3. Activities
- what - 11/11*

9.3.2 The reasons for the case study visual assessments may be summarised as:-

- 1 To examine existing situations
- 2 To brief the designer
- 3 To check the design progression
- 4 To make decisions
- 5 To check before a client presentation
- 6 To present the work, seek approval and instructions
- 7 To check work other than the designers

9.3.3 The personnel involved in the case study visual assessments may be summarised as:-

1. Industrial Designer
2. Industrial Designer's associates
3. Company management
4. Company marketing
5. Company engineers
6. Company's client management
7. Company's client engineering

9.3.4 The environments of the visual assessments in the case studies may be summarised as:-

1. Company location
2. Company associated location
3. Designer's location
4. Designer's associated location
5. A neutral location

9.3.5 The method of visual assessment in the case studies may be summarised as:-

1. By subjective appraisal

2. By subjective appraisal + verbal comment
3. By sophisticated subjective appraisal + verbal comments
4. By subjective appraisal + sophisticated verbal comments
5. By objective assessment

9.3.6 The stages in the design process of the visual assessments in the case studies may be summarised as:-

1. Briefing the designer at the beginning by Management
2. Briefing the designer at the beginning by Marketing
3. Briefing the designer at the beginning by Engineering
4. Before a client presentation
5. A client presentation
6. A design process
7. An engineering process
8. Re-briefing the designer
9. End of the design process

9.3.7 The additional analyses of the visual assessments in the case studies may be summarised as:-

1. Unsuccessful meeting
2. No check or assessment when expected
3. Unexpected check or assessment
4. Company make a visual assessment before calling in a designer.
5. Company make a visual assessment and do not inform the designer
6. Meeting increases in size during a presentation
7. Work displayed gradually during a presentation
8. Two meetings with assessment in immediate sequence
9. Designer has to clear a space for his work before a presentation



#### 9.4 Sophisticated choosing events in the case studies

##### 9.4.1 During case number 7.13 Company F : Product Ferrodor 10x7/A:-

"7.13.5 Under the verbal direction of the Industrial Designer all the paperwork was examined, the problem was explained, and a number of visual inconsistencies pointed out e.g., the possibility of confusing '5' and 'S', 'I' and '1', 'B' and '8', etc.. Still under the verbal direction of the designer it was decided to make simple choices first and to target down to difficult choices. All choices that could not be made by agreement were to be placed at the end.

- A. All choices were considered in an alphabetical order
- B. All simple choices were made and the eliminated choices crossed off the paper
- C. All not made choices were then grouped into A/B choices isolated from the character set, A/B choices affected by the rest of the character set and very difficult choices. A/B choices isolated from the rest of the character set were made and the eliminated choices crossed off the paper. A/B choices affected by the rest of the character set were made and the eliminated choices crossed off the paper. Very difficult choices were then considered and where possible, choices were made and the eliminated choices crossed off the paper.

The remaining very difficult choices were then examined, discussed and decisions taken with the difficulty of that choice being admitted by the meeting and the eliminated choices crossed off the paper.

The final set of characters was then checked-out by everyone at the meeting. No inconsistencies were found.

The Design Team agreed to document the final set of characters, to give each character a reference number and to distribute this documentation to everyone present at the meeting.

The meeting then agreed to abide by the choices it had taken"

This may be summarised as:-

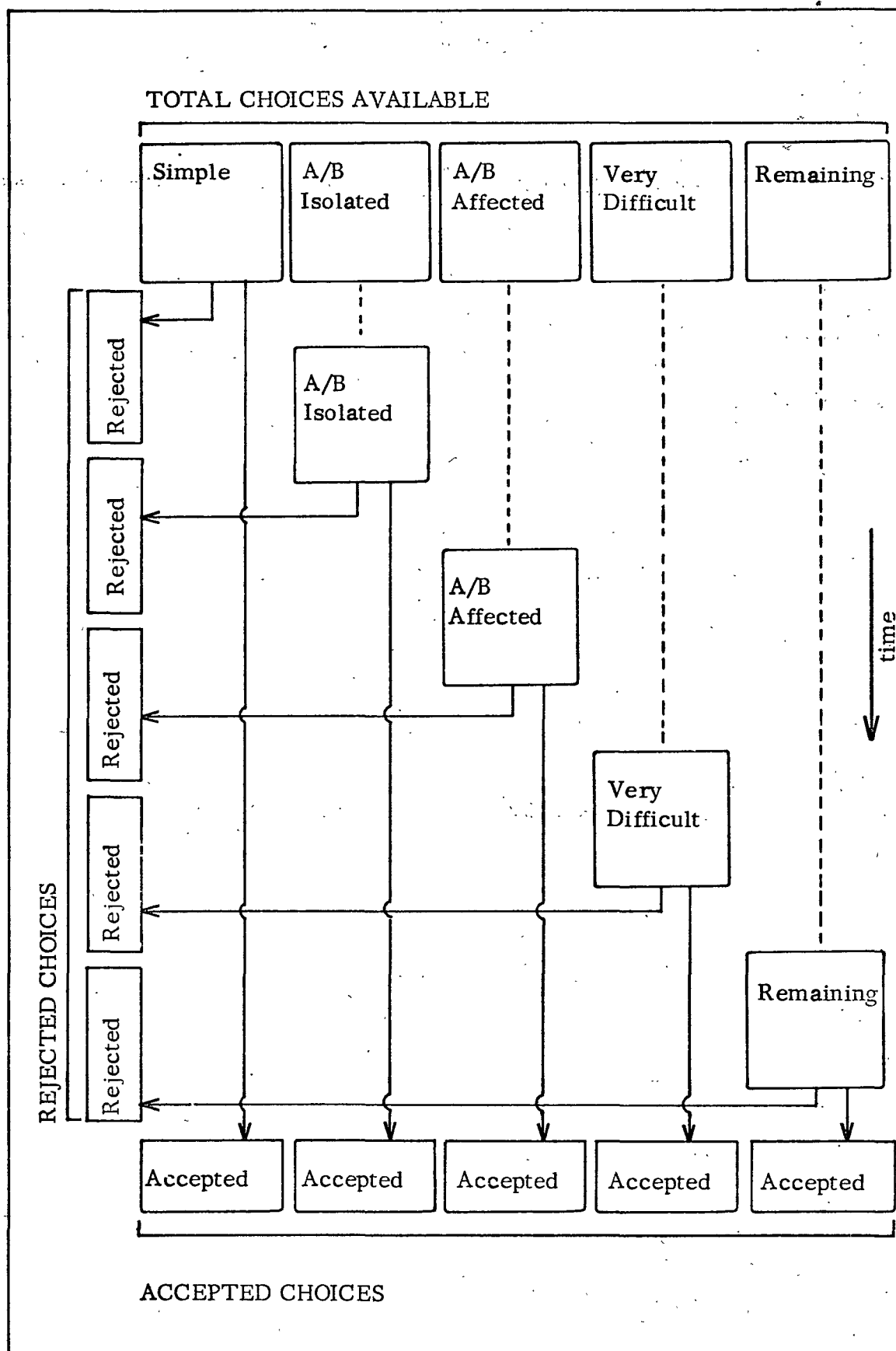


Fig. 22 Block diagram showing the sophisticated choosing process for the final set of characters for Ferrodot 10x7/A (See 7.13.5).

$$C_n - (\nabla C_{nw}) = C_w$$

where:

$C_n$  = all the choices available

$(\nabla C_{nw})$  = the targeting process of removing all the unwanted choices

$C_w$  = the target of wanted choices. (Fig. 22).

9.4.2 During case number 7.18 Company D : Product Bench Power Supply:-

"7.18.8 The people present were all standing and moving around. The Designer cleared the paperwork from the desks and laid out the eight models  $M_{1-8}$ , but before the Designer could say anything the General Manager said that he liked 'that one'  $M_3$ , which the Designer didn't like personally. The Designer stated that it would be a much more sophisticated method of choosing if the General Manager decided which of the design proposal models he didn't like and remove these from the table to leave eventually one that would appear more suitable than the others rather than immediately trying to choose one that at present appeared to appeal to him. The General Manager agreed to this selection method and proceeded to select and remove those which did not appeal to him.

From the possible choices  $M_{1-8}$  he removed  $M_1$ ,  $M_4$ ,  $M_5$  leaving  $M_2$ ,  $M_3$ ,  $M_6$ ,  $M_7$  and  $M_8$ . He removed  $M_2$ ,  $M_7$  and  $M_8$  leaving  $M_3$  and  $M_6$ . He removed  $M_3$  then which left  $M_6$  ( $M_6$  was the favoured choice of the Designer).

The General Manager expressed great delight in this choosing method and replaced all the models on the desk top and telephoned the Sales Manager to invite him to join the meeting. When the Sales Manager arrived, the General Manager outlined the project and asked the Sales Manager to choose from the eight models by removing those he didn't like. The Sales Manager proceeded to do this. From the choices of  $M_{1-8}$  he removed  $M_1$ ,  $M_5$  and  $M_7$ , followed by  $M_8$ , then  $M_6$ , leaving  $M_2$ .

The General Manager decided to ignore the Sales Manager's choice and began to explain why that which he had chosen

would be the best model to choose."

This may be summarised as:-

$$M_{1-8} - (M_1 + M_4 + M_5) - (M_2 + M_7 + M_8) - M_3 = M_6$$

$$\text{or } C_{1-8} - (C_{1,2,3,4,5,7,8}) = C_6$$

$$\text{or } C_{1-8} - (7C_{nw}) = C_6$$

$$\text{or } C_n - (\nabla C_{nw}) = C_w$$

where:

$M_{1-8}$  = the eight models under consideration

$C_{1-8}$  = the eight choices available

$7C_{nw}$  = the seven choices not wanted

$C_6$  = the choice wanted

$C_n$  = all the choices available

$(\nabla C_{nw})$  = the targeting process of removing all the not wanted choices

$C_w$  = the target of wanted choices (Fig. 23)

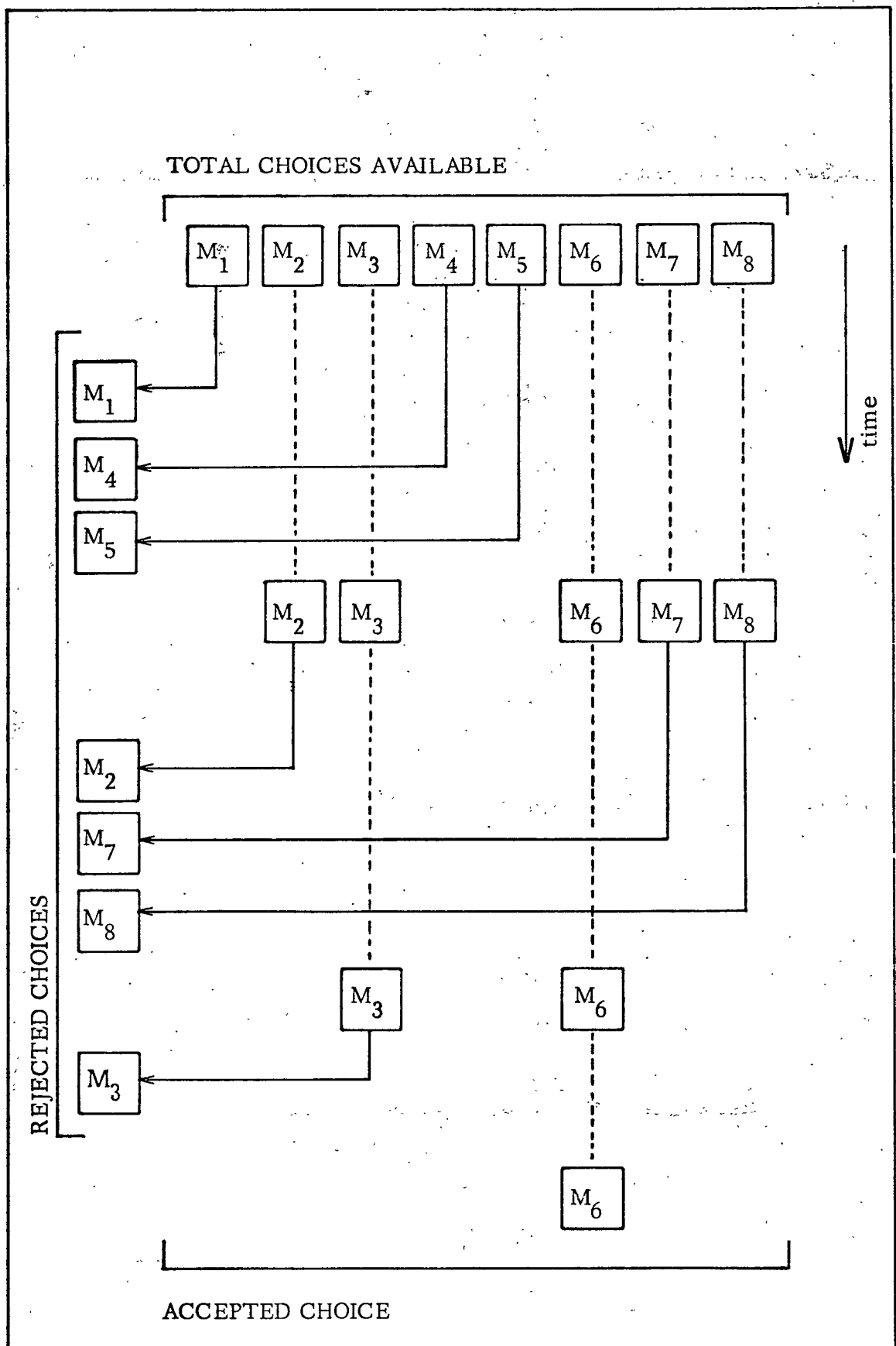


Fig. 23. Block diagram showing the sophisticated choosing process from eight models of bench power supply units. (See 7.18.8).

#### 9.4 Detailed analysis of the desk data

(For full detailed analysis see Appendix 12.3)

9.4.1 The subject of the visual assessments listed in the desk data may be summarised as:-

1. Two and three dimensional information
2. Two and three dimensional ideas
3. Activities
4. Iconic, analog , symbolic models and actual nature

9.4.2 The reason for the visual assessments listed in the desk data may be summarised as:-

1. To examine existing situations
2. To brief the designer
3. To check the design progression
4. To make decisions
5. To check before a client presentation
6. To present the work, seek approval and instructions
7. To check work other than the designers
8. To check or seek information u ?
9. To placate the client h ?

9.4.3 The personnel listed in the desk data may be summarised as:-

1. Industrial Designer
2. Industrial Designer's Associate
3. Company management
4. Company marketing
5. Company engineering

9.4.4 The types of environment listed in the desk data may be summarised as:-

1. Company location
2. A neutral location

9.4.5 The methods of visual assessment listed in the desk data may be summarised as:-

1. By subjective appraisal
2. By subjective appraisal and verbal comments
3. By sophisticated subjective appraisal and verbal comments

4. By subjective appraisal and sophisticated verbal comments
5. By confusing subjective appraisal
6. By confusing subjective appraisal and confusing verbal comments
7. By objective assessment

9.4.6 The stages in the design process listed in the desk data may be summarised as:-

1. Designer getting the work
2. Organising the work
3. Presenting the outcome
4. Doing the work
5. Producing the ideas
6. Company obtaining the designer
7. Marketing
8. Production
9. Examining the present situation
10. Pre-design phase
11. Beginning design phase
12. Middle design phase
13. End design phase
14. Post-design phase
15. Re-employing the designer

9.4.7 The additional analysis of the desk data listed may be summarised as:-

1. Some types of presentation work unacceptable to engineers
2. Designer not given all the information at the right time
3. A company person presents the designer's work
4. Meeting increases in size during a visual assessment
5. There are human factors and politics during a commission and presentation

9.4.8 The sophisticated choosing activities from the desk data are:-

8.5.1 Battleaxe

8.5.1 T chart

8.5.1 Decision matrix

8.5.1 Decision trees

8.5.1 Optimisation

8.5.2 Checklists

8.5.2 Selection criteria

8.5.2 Selection criteria

8.5.2 Specification writing

8.5.2 Quirk's Reliability Index

8.5.3 Optimisation

8.5.3 Trade of decisions

8.5.4 Analytical methods

8.5.4 Decision matrices

8.5.5 General decision matrix

8.5.6 Feasibility testing

8.5.6 Appeal, where I recognise that this conforms well to those criteria which are generally accepted to be the mark of good design?

8.5.7 Pupilography

8.5.7 Electro-oculography

8.5.7 Time lapse recordings

This may be summarised as:-

1. Analysing charts

2. Analytical objective ergonomic data



## 10 SYNTHESIS

10.1 There are six main groupings of factors that form the basis of visual assessment methods used by consultant industrial designers:-

1. The work being assessed
2. The reason for the assessment
3. The assessors
4. The method of assessment
5. The environment of assessment
6. The stage in the design process

## 10.2 The work being assessed

### 10.2.1 We can term the work being assessed as:-

1. Two and/or three dimensional information
2. Two and/or three dimensional ideas
3. Activities
4. Models of an iconic, analog, symbolic, or real nature

### 10.2.2 There may be:-

1. One piece of work submitted for assessment
2. Several pieces of work submitted for assessment
3. One major piece of work together with one minor piece of work submitted for assessment.
4. One major piece of work together with several minor pieces of work submitted for assessment.
5. Several major pieces of work together with one minor piece of work submitted for assessment.
6. Several major pieces of work together with several minor pieces of work submitted for assessment.

### 10.2.3 The work may have:-

1. Existed before the assessment
2. Been created during the assessment
3. Part existed before the assessment, and part created during the assessment.

### 10.2.4 If there is more than one piece of work submitted for assessment then:-

1. It may have been assembled before the assessment
2. It may never have been assembled before the assessment

### 10.2.5 The work may be considered:-

1. Appropriate for that assessment
2. Inappropriate for that assessment
3. Part appropriate, and part inappropriate for that assessment

### 10.2.6 The work may also be considered as:-

1. Satisfactory for that assessment
2. Unsatisfactory for that assessment
3. Part satisfactory, and part unsatisfactory for that

assessment.

10.2.7 Therefore the work being assessed may be represented as:-

$$((IN_{2\&3d}, ID_{2\&3d}, Ac) (Mo_{i,a,s,r})(n))$$

where:

$IN_{2\&3d}$  = two and three dimensional information

$ID_{2\&3d}$  = two and three dimensional ideas

$Ac$  = activities

$Mo_{i,a,s,r}$  = models of an iconic, analog, symbolic or real nature

$n$  = one or more of

Note: the representation is subject to the remainder of 10.2 (Fig. 24).

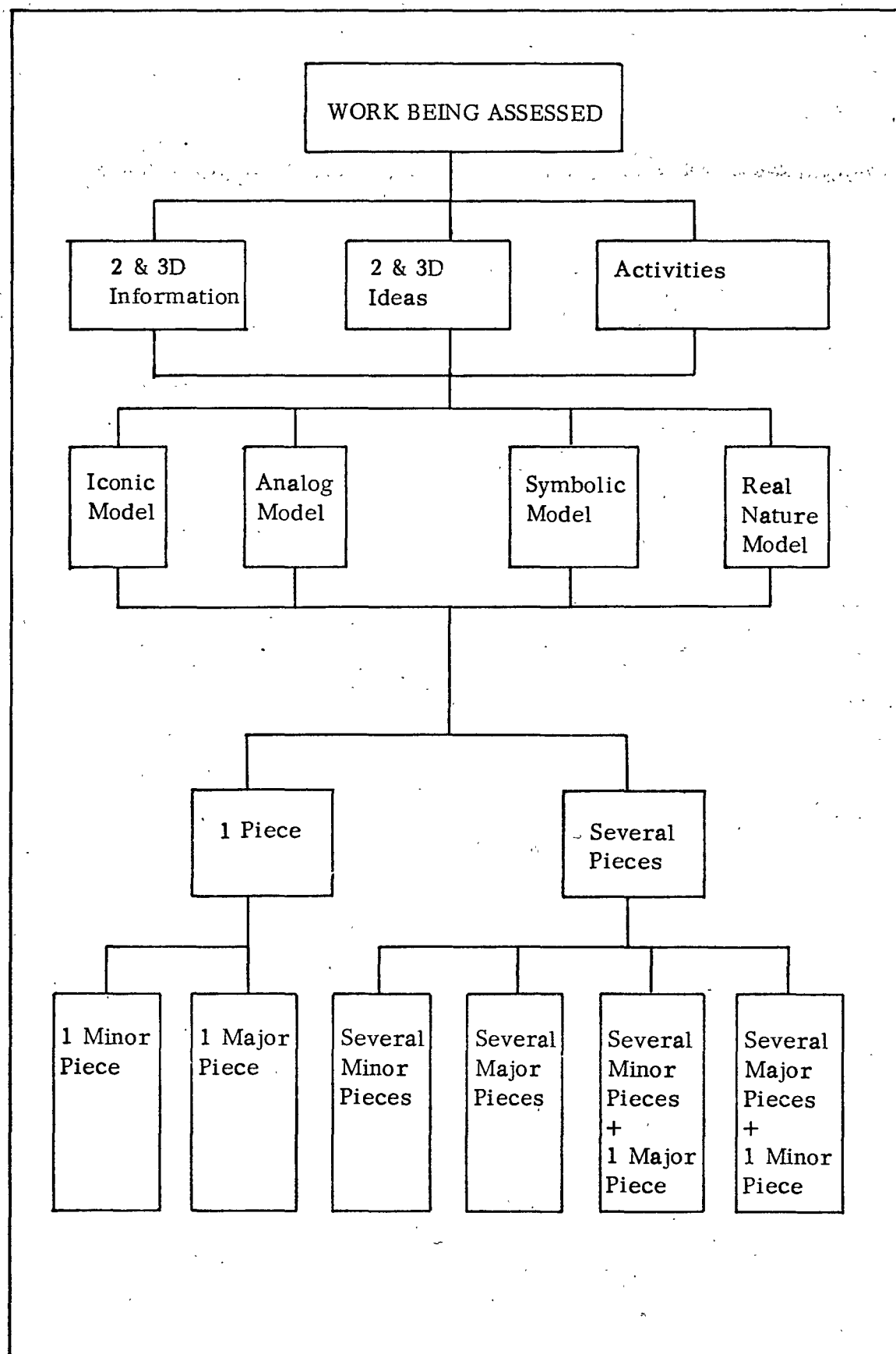


Fig. 24 Block diagram of the work being assessed

### 10.3 The reason for the assessment

#### 10.3.1 Assessments occur in order:-

1. To transmit information
2. To receive information
3. To monitor information
4. To modulate information

#### 10.3.2 In the sequence of the design process this would be:-

1. For the company to check the work before deciding to contract a designer
2. For the company to check the work of the designer before contracting him
3. For the company to check their work before briefing the designer
4. For the company to brief the designer
5. For the designer to check the work after a briefing
6. For the designer to identify problems in the work
7. For the designer to resolve problems in the work
8. For the designer to check solutions in the work
9. For the designer to make decisions on the work
10. For the designer to check the progression of the work
11. For the designer to check the work before subcontracting
12. For the designer to check the progress of the subcontracted work
13. For the designer to check the subcontracted work before acceptance
14. For the designer to check the work before a client presentation
15. For the designer to present the work to the client
16. For the designer to seek approval of the work from the client
17. For the designer to receive instructions from the client
18. For the company to check the work from the designer
19. For the company to give approval of the work from the designer
20. For the company to give instructions on the work from the designer

21. For the company to identify problems in the work from the designer
22. For the company to resolve problems in the work from the designer
23. For the company to check solutions in the work from the designer
24. For the company to make decisions on the work from the designer
25. For the company to check the work from the designer, after the presentation
26. For the company to assess the work from the designer to date
27. For the designer to assess the work for the client to date

10.3.3 Therefore the reason for the assessment may be represented as:

$(IN_{t,r,mm})$

where

$IN_{t,r,mm}$  = information transmitted, received, monitored or modulated

Note: the representation is subject to the remainder of 10.3 (Fig. 25).

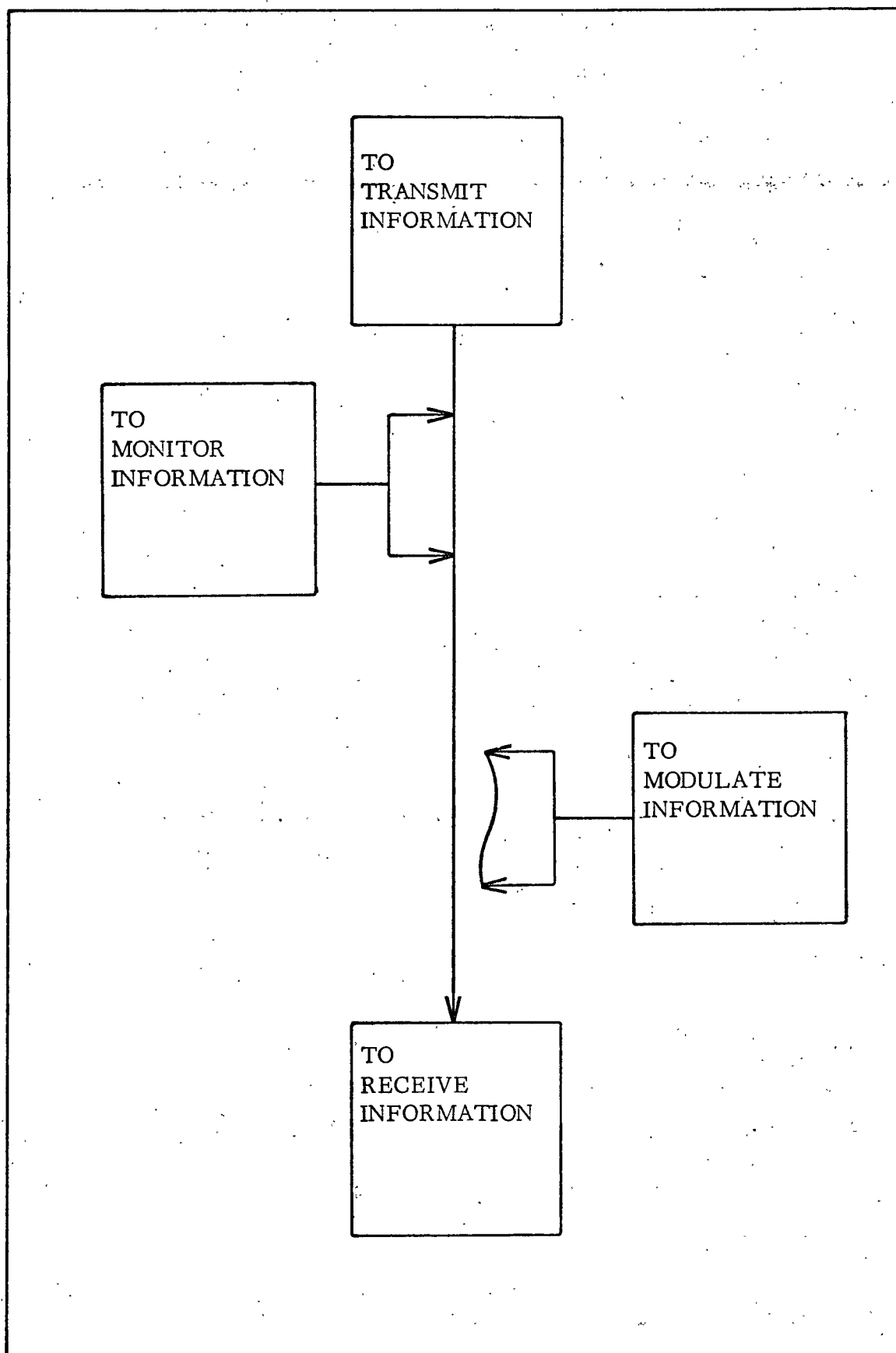


Fig. 25 Block diagram of the reason for assessment

## 10.4 The Assessors

10.4.1 There are six types of assessors:-

1. The designer
2. The designer's associates
3. The company engineering personnel
4. The company marketing personnel
5. The company management personnel
6. The company associated client

10.4.2 There are 63 groupings of assessors:-

1. Designer only
2. Design associates only
3. Designer and design associates
4. Company engineering only
5. Company marketing only
6. Company management only
7. Company associated client only
8. Company engineering and marketing
9. Company engineering and management
10. Company engineering and associated client
11. Company engineering, marketing and management
12. Company engineering, marketing and associated client
13. Company engineering, marketing, management and associated client
14. Company engineering, management and associated client
15. Company marketing and management
16. Company marketing and associated client
17. Company marketing, management and associated client
18. Company management and associated client
19. Company engineer and the designer
20. Company engineer and the design associates
21. Company engineer, the designer and the design associates
22. Company marketing and the designer
23. Company marketing and the design associates
24. Company marketing, the designer and the design associates
25. Company management and the designer
26. Company management and the design associate
27. Company management, the designer and the design

$$\begin{array}{l} 6 \times 5 = 30 \\ 6 \times 5 \times 4 = 120 \\ 3 \times 2 = 6 \\ 6 \times 5 \times 4 \times 3 = 360 \\ 4 \times 3 \times 2 = 24 \\ 6 + 15 + 20 + 15 + 6 + 1 = 63 \end{array}$$



associate

28. Company associated client and the designer

29. Company associated client and the design associates

30. Company associated client, the designer and the design associates

31. Company engineering, marketing and the designer

32. Company engineering, marketing and the design associates

33. Company engineering, marketing, the designer and the design associates

34. Company engineering, management and the designer

35. Company engineering, management and the design associates

36. Company engineering, management, the designer and the design associates

37. Company engineering, associated client and the designer

38. Company engineering, associated client and the design associates

39. Company engineering, associated client, the design and the design associate

40. Company engineering, marketing, management and the designer

41. Company engineering, marketing, management and the design associate

42. Company engineering, marketing, management, the designer and the design associate

43. Company engineering, marketing, associated client and the designer

44. Company engineering, marketing, associated client and the design associates

45. Company engineering, marketing, associated client, the designer and the design associates

46. Company engineering, marketing, management, associated client, and the designer

47. Company engineering, marketing, management, associated client and the design associates

48. Company engineering, marketing, management, associated client, the designer and the design associates

49. Company engineering, management, associated client and the designer

50. Company engineering, management, associated client and the design associates

51. Company engineering, management, associated client, the designer and the design associates
52. Company marketing, management and the designer
53. Company marketing, management and the design associates
54. Company marketing, management, the designer and the design associates
55. Company marketing, associated client and the designer
56. Company marketing, associated client and the design associates
57. Company marketing, associated client, the designer and the design associates
58. Company marketing, management, associated client and the designer
59. Company marketing, management, associated client and the design associates
60. Company marketing, management, associated client, the designer and the design associates
61. Company management, associated client and the designer
62. Company management, associated client and the design associates
63. Company management, associated client, the designer and the design associates

This may be represented as:-

$$((PD + CP) + (DP \times CP))$$

where:

DP = Design personnel

CP = Company personnel

10.4.3 Also the assessment evaluation may be considered as being by:-

1. A single person only
2. A single person with a single person confirmation
3. A single person with a group confirmation
4. A group only
5. A group with a single person confirmation
6. A group with a group confirmation

Which will be:-

1. In the presence of the designer
2. In the absence of the designer with the designer being officially informed later
3. In the absence of the designer with the designer being unofficially informed later
4. In the absence of the designer and the designer subsequently is not informed

This may be represented as:-

$$((P_n + P_{nc}) \pm D)$$

where:

$P_n$  = any number of personnel

$P_{nc}$  = any number of personnel choosing

$\pm$  = including or excluding the designer

10.4.4 Therefore the assessors may be represented as:-

$$((DP + CP) + (DP \times CP) + (P_n + P_{nc}) \pm D)$$

Note: the representation is subject to the remainder of 10.4 (Fig. 26).

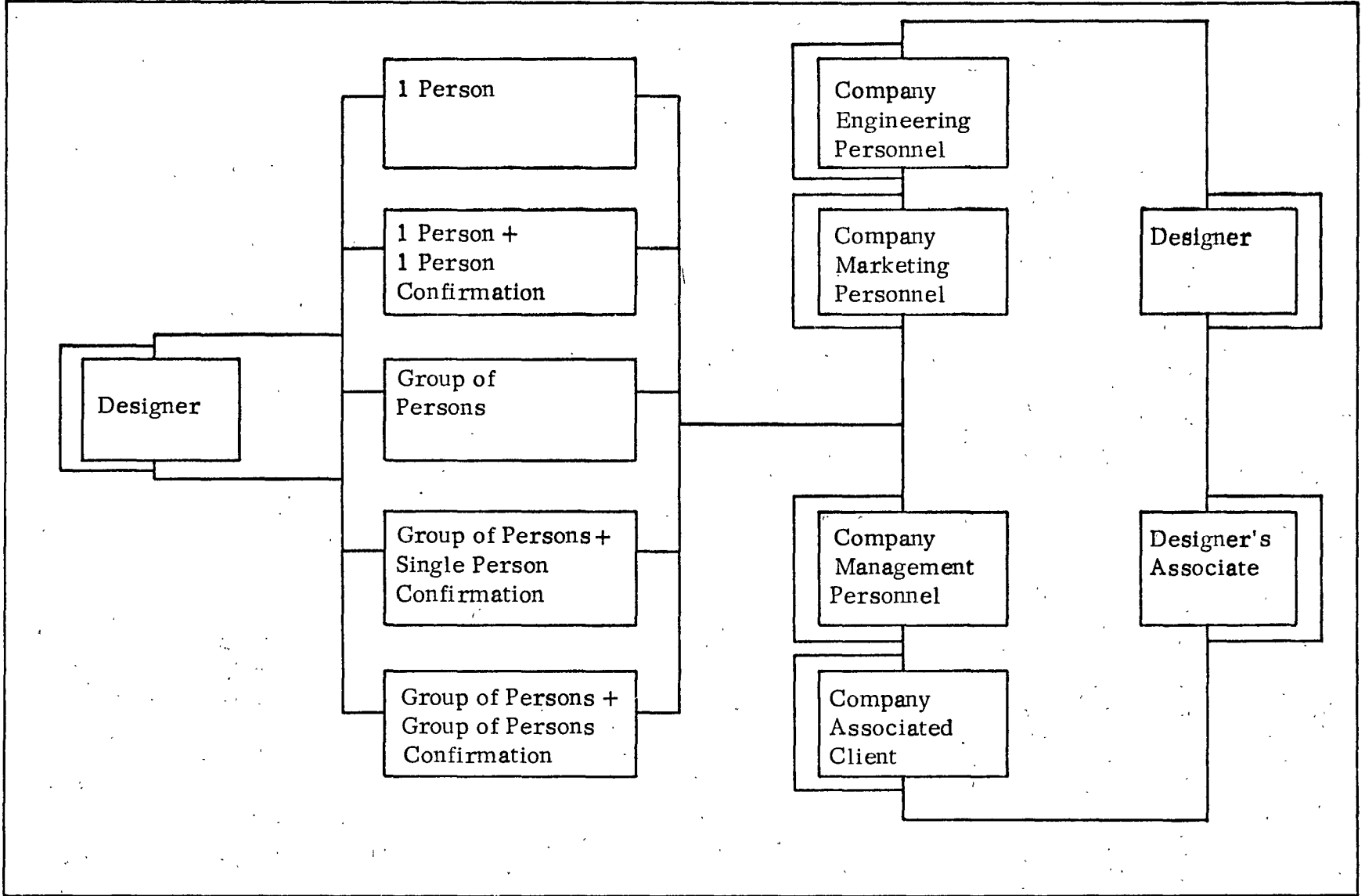


Fig. 26 Block diagram of the assessors

## 10.5 The method of assessment

### 10.5.1 The method of assessment will consist of choices

### 10.5.2 The process of choosing may be:-

1. A simple process
2. A long and harrowing process

### 10.5.3 The choices will be, positive, negative or neutral and could be qualified by a verbal response:-

1. Positive, 'I like that'
2. Negative, 'I don't like that'
3. Neutral, 'I don't know'

With the following variations:-

4. Positive positive, 'I like that, and my choices are invariably right'
5. Positive negative, 'I like that, and my choices are invariably wrong'
6. Positive neutral, 'I like that, and my choices are invariably invalid'
7. Negative positive, 'I don't like that, and my choices are invariably right'
8. Negative negative, 'I don't like that, and my choices are invariably wrong'
9. Negative neutral, 'I don't like that, and my choices are invariably invalid'
10. Neutral positive, 'I don't know, and my choices are invariably right'
11. Neutral negative, 'I don't know, and my choices are invariably wrong'
12. Neutral neutral, 'I don't know, and my choices are invariably invalid'

A plurality of choice will be:-

13. Plural positive, 'I like them all'
14. Plural negative, 'I don't like any of them'
15. Plural neutral, 'I don't know about any of them'

With the following variations:-

16. Plural positive positive, 'I like them all, and my choices are invariably right'
17. Plural positive negative, 'I like them all, and my

choices are invariably wrong'

18. Plural positive neutral, 'I like them all, and my choices are invariably invalid'

19. Plural negative positive, 'I don't like any of them, and my choices are invariably right'

20. Plural negative negative, 'I don't like any of them, and my choices are invariably wrong'

21. Plural negative neutral, 'I don't like any of them, and my choices are invariably invalid'

22. Plural neutral positive, 'I don't know about any of them, and my choices are invariably right'

23. Plural neutral negative, 'I don't know about any of them, and my choices are invariably wrong'

24. Plural neutral neutral, 'I don't know about any of them, and my choices are invariably invalid'

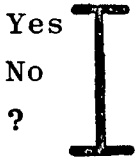
10.5.4 The choices may be divided by:-

1. An I bar process such as:-

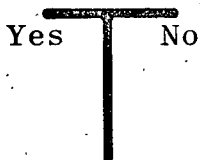
I bar positive, 'Yes that one'

I bar negative, 'No not that one'

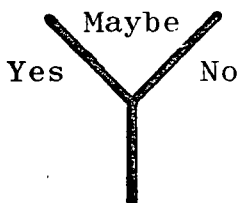
I bar neutral, 'Don't know'



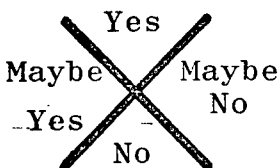
2. A T bar process dividing the choices into Yes, and No as:-



3. A Y bar process, dividing the choices into Yes, No, and Maybe as:-



4. An X bar process dividing the choices into Yes, No, Maybe Yes, and Maybe No as:-



10.5.5 The choices available will be:-

1. Not known
2. Partly known
3. Totally known
4. Not known, but eventually partly known
5. Not known, but eventually totally known
6. Partly known, but eventually totally known

10.5.6 The choosing process may:-

1. Come to a conclusion
2. Not come to a conclusion
3. Defer coming to a conclusion
4. Become confused

10.5.7 The choosing process may also:-

1. Reduce the number of choices available
2. Keep to the same number of choices available
3. Enlarge the number of choices available

10.5.8 The choosing will be based on:-

1. The evidence presented
2. The evidence implied
3. The evidence presented and implied

10.5.9 The opinions for the choosing will be from:-

1. The people present
2. Implied on behalf of people absent but with a vested interest in the choosing
3. Implied on behalf of the ultimate consumer

10.5.10 Therefore the method of assessment may be represented as:-

$(C_{I,T,Y,X})$

where:

$C_{I,T,Y,X}$  = I bar, T bar, Y bar or X bar choosing methods

Note: the representation is subject to the remainder of 10.5 (Fig. 27)



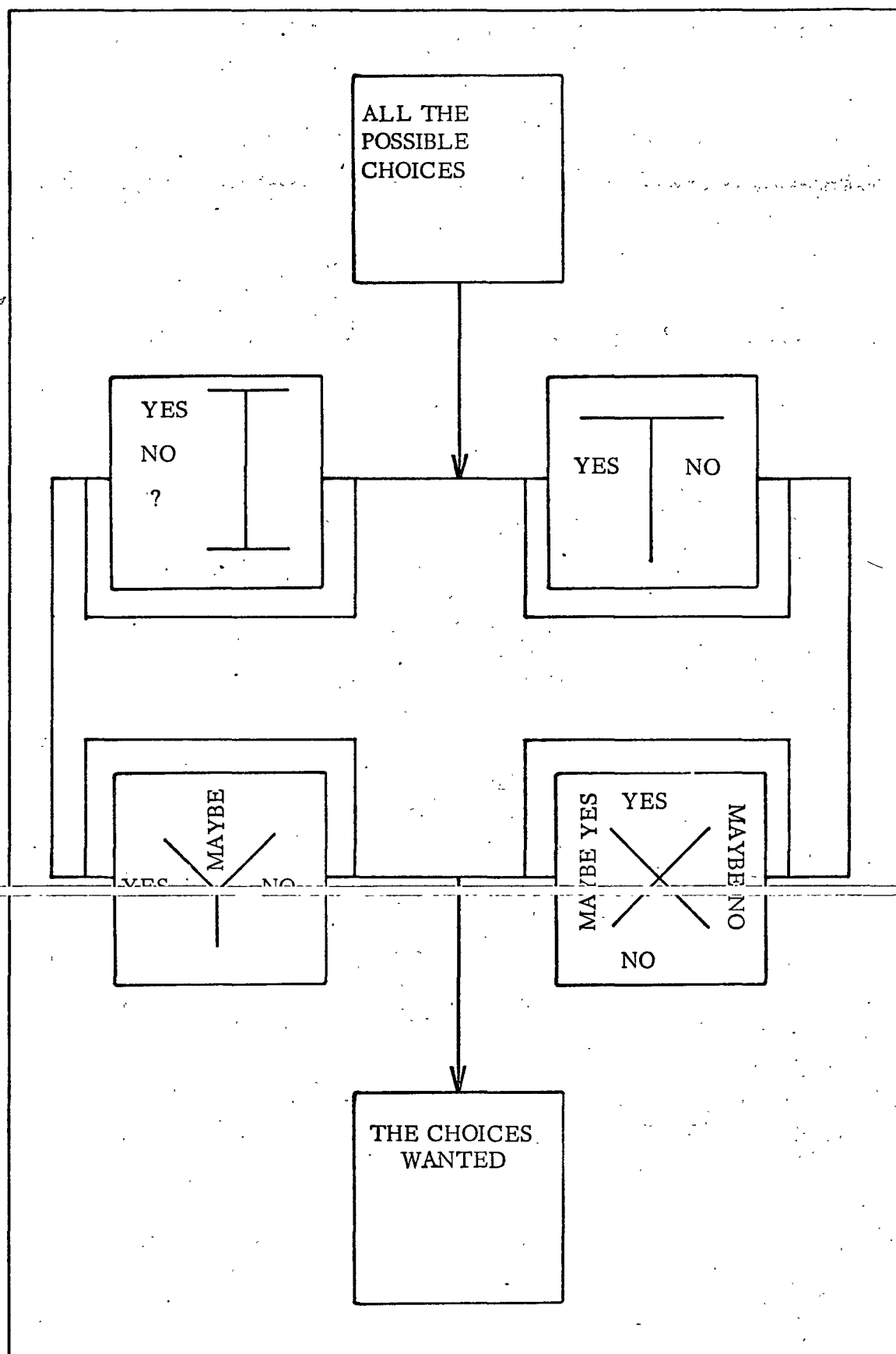


Fig. 27 Block diagram of the method of assessment

## 10.6 The environment of assessment

### 10.6.1 There are five main locations for assessment

2. Company location
2. Company associated client location
3. Designer's location
4. Designer's associated location
5. A neutral location

### 10.6.2 In the client location the environment may be:-

1. Company reception area location
2. Company open plan work bench location
3. Company open plan drawing board location
4. Company open plan office desk location
5. Company small office work bench location
6. Company small office drawing board location
7. Company small office desk location
8. Company office with conference desk location
9. Company conference room location
10. Company lecture theatre location

### 10.6.3 In the associated location the environment may be:-

1. Company associated client reception area location
2. Company associated client open plan work bench location
3. Company associated client open plan drawing board location
4. Company associated client open plan office desk location
5. Company associated client small office work bench location
6. Company associated client small office drawing board location
7. Company associated client small office desk location
8. Company associated client office with conference desk location
9. Company associated client conference room location
10. Company associated client lecture theatre location

### 10.6.4 In the designer's location the environment may be:-

1. Designer's house location
2. Designer's studio location
3. Designer's workshop location

4. Designer's conference room location

10.6.5 In the designer's associated location the environment may be:-

1. Designer's associate's house location
2. Designer's associate's studio location
3. Designer's associate's workshop location
4. Designer's associate's conference room location

10.6.6. In a neutral location the environment may be:-

1. Any place and appropriate for assessment
2. Any place and inappropriate for assessment

10.6.7 Principally the locations are interior, but allowance must be made for exterior locations.

1. Interior locations
2. Exterior locations

10.6.8 The lighting for the interior locations may be:-

1. Daylight only
2. Daylight plus artificial supplementary lighting
3. Daylight plus permanent artificial supplementary lighting
4. Permanent artificial lighting only

10.6.9 The lighting for the exterior locations may be:-

1. Daylight only
2. Half light only
3. Half light plus artificial supplementary lighting
4. Artificial lighting only

10.6.10 Location control: of the five main locations for assessment only one is within the designer's control:-

1. The designer's location

10.6.11 The environment of the assessment may be represented as:-

(L<sub>c</sub>, ca, d, da, ne)

where:

$L_c$  = company location

$L_{ca}$  = company associated client's location

$L_d$  = designer's location

$L_{da}$  = designer's associated location

$L_{ne}$  = neutral location

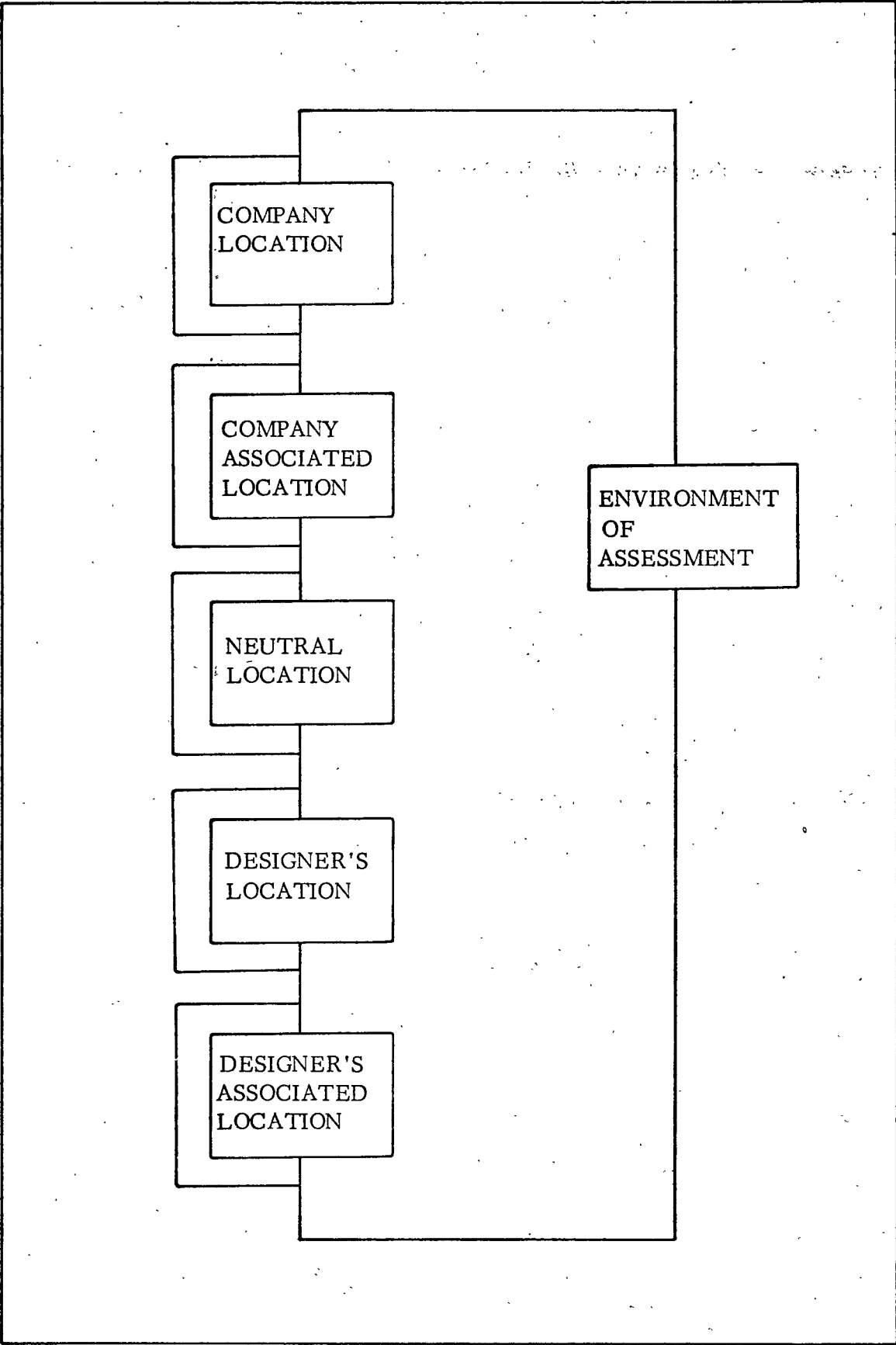


Fig. 28 Block diagram of the environments of assessment

## 10.7 The stage in the design process

10.7.1 At the beginning of the association of the consultant industrial designer and his industrial clients, the company may, or may not, assess the designer's work.

10.7.2 At the briefing of the designer by any of the company personnel there may, or may not, be an assessment.

10.7.3 Within a design phase there may, or may not, be an assessment:

1. Before a design process
2. During a design process
3. After a design process

10.7.3 Within an industrial production phase there may, or may not, be an assessment

10.7.4 Within an industrial marketing phase there may, or may not, be an assessment.

10.7.5 After the design and industrial phases there may, or may not, be an assessment of the product.

10.7.6 After the design and industrial phases there may, or may not, be an assessment of the designer's capabilities with a view to future association.

10.7.7 There may, or may not, be an assessment before a client presentation.

10.7.8 At a client presentation there may, or may not, be an assessment

10.7.9 After a client presentation with, or without, an assessment there may, or may not, be an assessment.

10.7.10 The assessment may be:-

1. Unexpected and unprepared for
2. Unexpected and prepared for

3. Expected and unprepared for
4. Expected and prepared for

10.7.11 The assessment may occur:-

1. once at the same meeting in the same location
2. More than once in the same meeting, at the same location
3. More than once in more than one meeting, in the same location.
4. More than once in more than one meeting, in different locations.

10.7.12 Therefore the stage in the design process may be represented as:-

$(PD(S_n))$

where:

PD = the design process

$S_n$  = the stages in the design process

Note: the representation is subject to the remainder of 10.7 (Fig. 29).

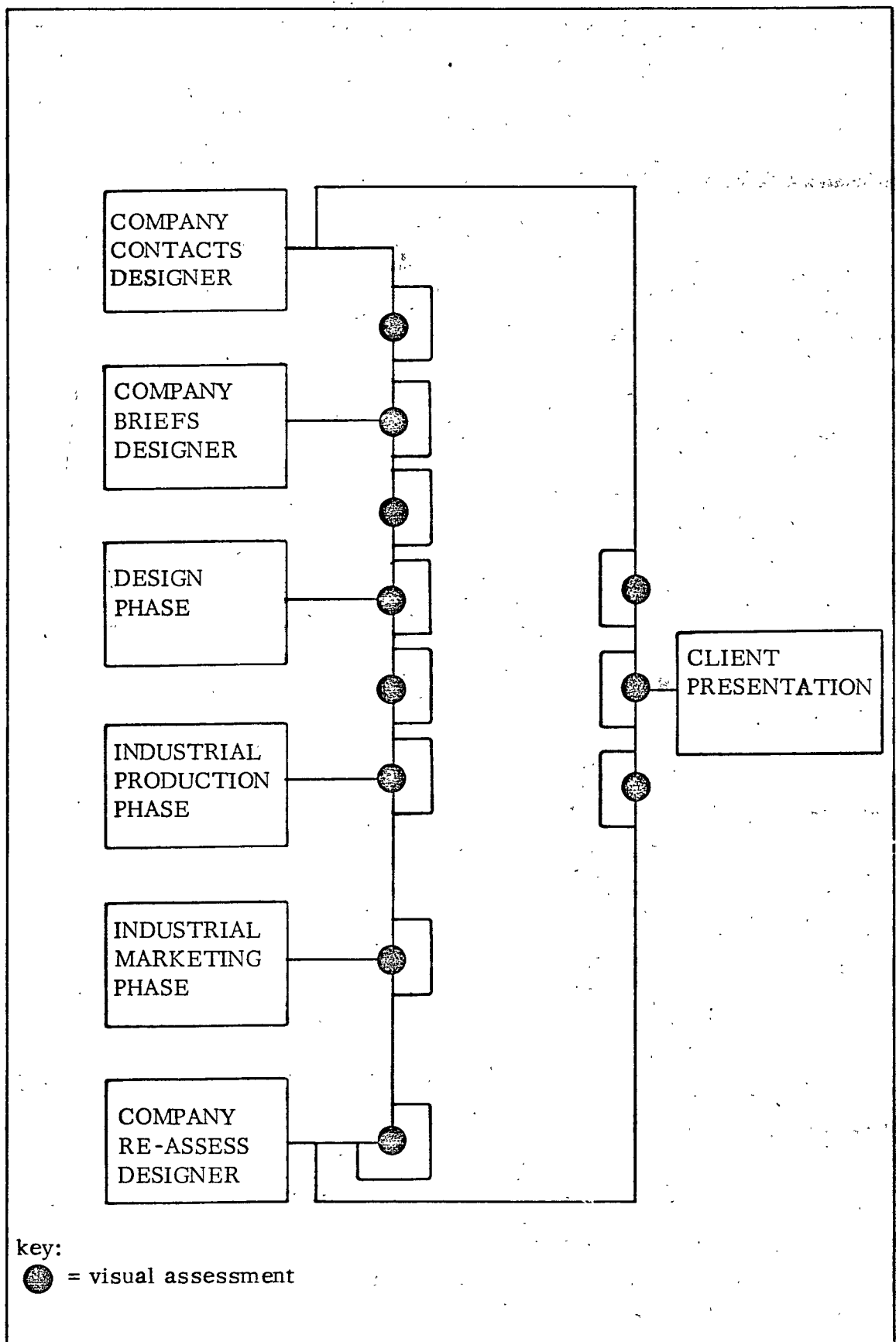


Fig. 29 Block diagram of the stages in the design process when the possibility of visual assessment occur.



## 10.8 Synthesis of constituents

10.8.1 The six main groupings of factors that form the constituents of visual assessment methods may be expressed as:

$$VA = (F_1 W_{a1} + F_2 R_{a2} + F_3 A_{a3} + F_4 M_{a4} + F_5 E_{a5} + F_6 S_{a6})$$

where:

VA = the visual assessment

$F_n$  = a function of

$a_n$  = an aspect of

W = the work being assessed

R = the reason for the assessment

A = the assessors

M = the method of assessment

E = the environment of assessment

S = the stage in the design process

10.8.2 These constituents may be further expressed as:

$$1. W = F_1((IN_{2\&3d}, ID_{2\&3d}, Ac)(Mo_{i,a,s,r}(n))_{a1})$$

$$2. R = F_2(IN_{t,r,mm})_{a2}$$

$$3. A = F_3((DP + CP) + (DP \times CP) + (P_n + P_{nc}) \pm D)_{a3}$$

$$4. M = F_4(C_{I,T,Y,X})_{a4}$$

$$5. E = F_5(L_{c,ca,d,da,ne})_{a5}$$

$$6. S = F_6(PD(S_n))_{a6}$$

where:

1.  $((IN_{2\&3d}, ID_{2\&3d}, Ac)(Mo_{i,a,s,r}(n)))$  = two and three dimensional information, two and three dimensional ideas and activities expressed in iconic, analog, symbolic or actual nature models, in terms of one or more than one of, as explained in 10.2, and subject to the remainder of 10.2.

2.  $(IN_{t,v,mm})$  = information transmitted, received, monitored or modulated as explained in 10.3, and subject to the remainder of 10.3.

3.  $(DP+CP) + (DP_xCP) + (P_n+P_{nc}) \pm D$  = the design personnel and the company personnel in terms of any number of persons, with any number of persons choosing, with, or without, the designer being present. As explained in 10.4, and subject to the remainder of 10.4.

4.  $(C_{I,T,Y,X})$  = I bar, T bar, Y bar or X bar choosing methods, as explained in 10.5, and subject to the remainder of 10.5.

5.  $(L_{c,ca,d,da,ne})$  = Company location, company associated location, designers location, designers associated location or a neutral location, as explained in 10.6, and subject to the remainder of 10.6.

6.  $(PD(S_n))$  = The stages in the design process, as explained in 10.7, and subject to the remainder of 10.7.

10.8.3 Therefore  $VA = (F_1W_{a1}+F_2R_{a2}+F_3A_{a3}+F_4M_{a4}+F_5E_{a5}+F_6S_{a6})$

may be further expressed as (Fig. 30).

$$VA = \left[ \begin{array}{l} F_1((IN_{2\&3d}, ID_{2\&3d}, Ac)(Mo_{i,a,s,r}(n))_{a1} \\ F_2(IN_{t,r,mm})_{a2} \\ F_3((DP+CP) + (DP \times CP) + (P_n + P_{nc}) \pm D)_{a3} \\ F_4(C_{I,T,Y,X})_{a4} \\ F_5(L_{c,ca,d,da,ne})_{a5} \\ F_6(PD(S_n))_{a6} \end{array} \right]$$

Fig. 30

10.8.4 Further, we may regard aspects of the visual assessment as:

1. The work being assessed in a state of being pushed or pulled to the visual assessment by the reason of the ~~the~~ assessment.

As depicted by (Fig. 31):

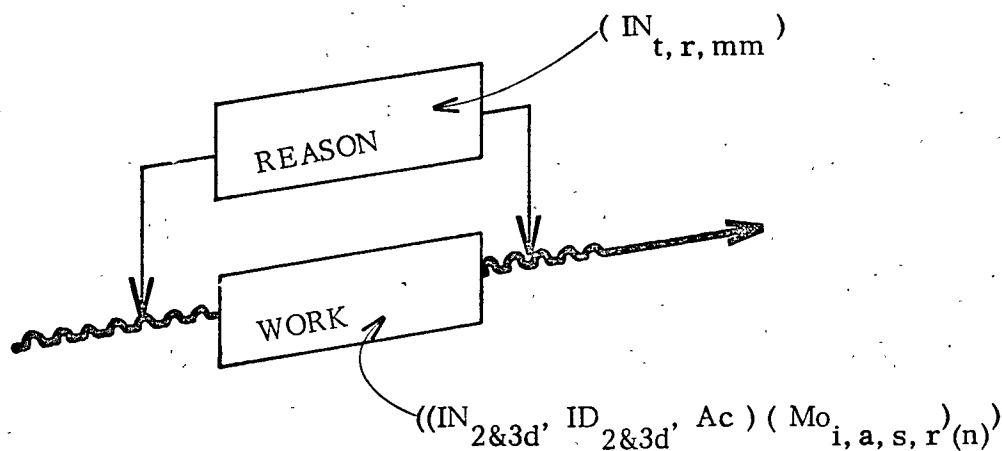


Fig. 31

2. The method of assessment as practiced by the assessors in the environment of assessment.

As depicted by (Fig. 32):

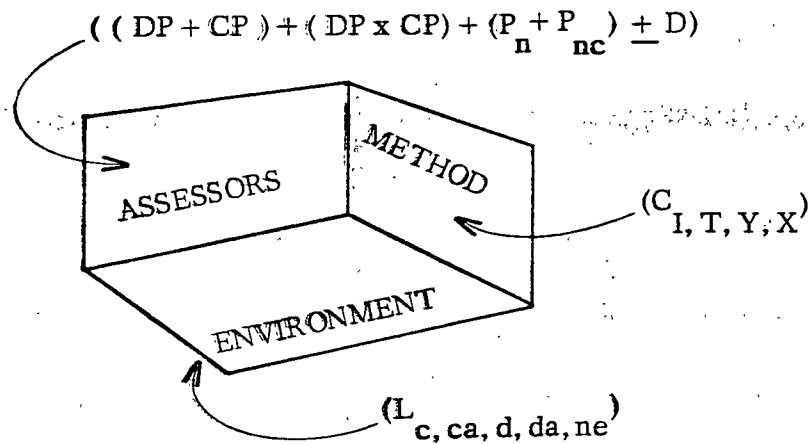


Fig. 32

3. The stage in the design process considered as the two parallel activities of the client's product planning, and the designer's activities.

As depicted by (Fig. 33):

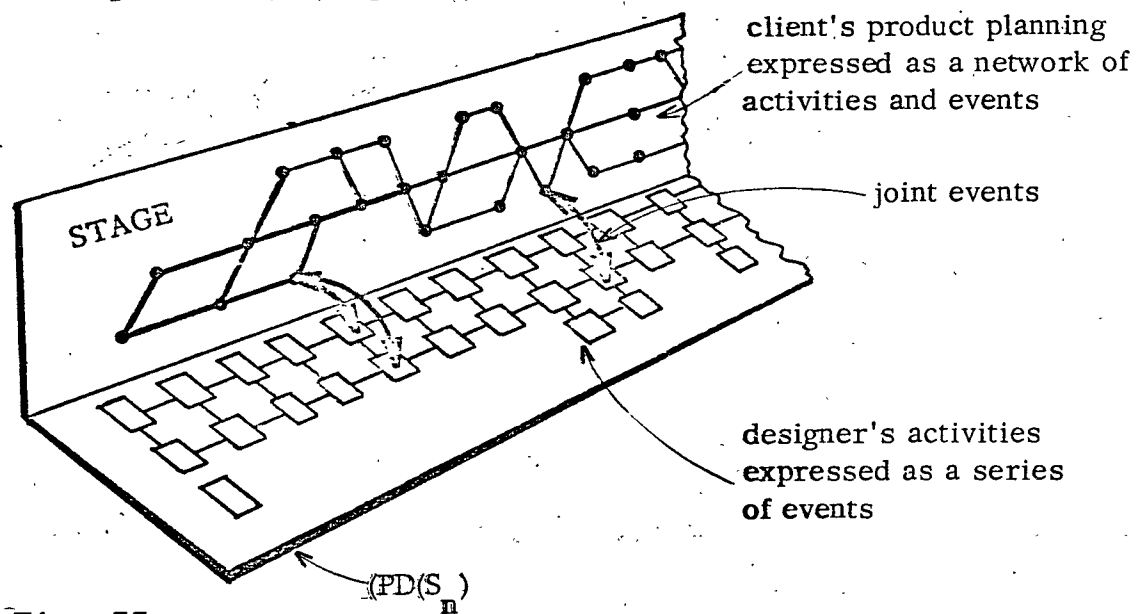
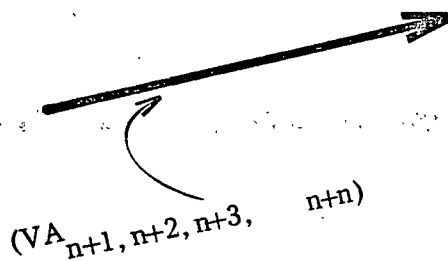


Fig. 33

4. Time in the project development may be expressed as a progression of visual assessments such that (Fig. 34):



(VA<sub>n+1, n+2, n+3, n+n</sub>)

Fig. 34

10.8.5 These aspects may be assembled to form a model for visual assessment methods, as depicted by (Fig. 35):

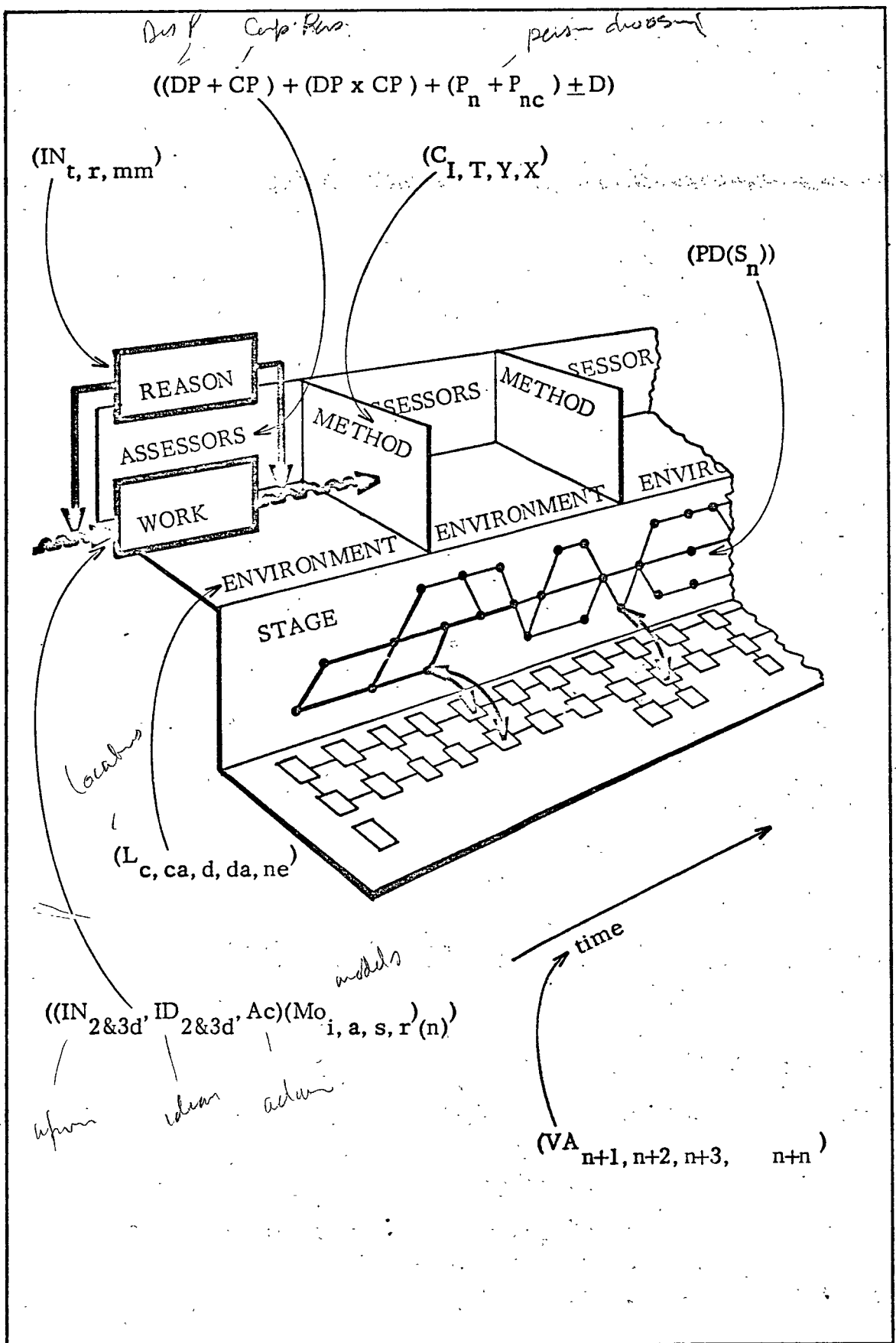


Fig. 35 Model depicting the visual assessment method.

## 11. CONCLUSIONS

11.1 Visual assessment methods used by designers in Industry may be represented by four models:

1. A word model (Fig. 36)
2. An alpha numeric model (Fig. 37)
3. An alpha numeric and illustrative model (Fig. 38)
4. A block diagram model (Fig. 39)

11.2 While compiling this research project the author was struck by the following three points:-

11.2.1 There is very little published work on the theory and practice of industrial design consultancy. Van Doren's publication of 1940, 'Industrial Design' (Ref. 20) is the only substantial work on the subject that the author has found. It is acknowledged that industrial design consultancy is a 'produce or perish' profession, as opposed to a 'publish or perish' profession. This may be a reason for a lack of published information.

11.2.2 There exists a body of knowledge on various sophisticated techniques and aspects of designing under the general heading of design methods, but this knowledge seems remote from the practice of industrial design consultancy.

11.2.3 It appears that the Industrial Design Consultant has very little control over his work when it is in the hands of the company. Conversely, the company has probably very little control over its work while it is in the hands of the Industrial Design Consultant.

*academics  
produce  
& publish*

*[scribble]*

Visual assessments  
are functions of

1. The work being assessed
2. The reason for the assessment
3. The assessors
4. The method of assessment
5. The environment of assessment
6. The stage in the design process

*Quality of work*

*Design characteristics*

*usability*

*conviction,  
confidence*

Fig. 36 A word model of visual assessment methods



$$VA = \left\{ \begin{array}{l} F_1((IN_{2\&3d}, ID_{2\&3d}, Ac)(Mo_{i,a,s,r}(n))_{a1}) \\ F_2(IN_{t,r,mm})_{a2} \\ F_3((DP + CP) + (DP \times CP) + (P_n + P_{nc}) \pm D)_{a3} \\ F_4(C_{I,T,Y,X})_{a4} \\ F_5(L_{c,ca,d,da,ne})_{a5} \\ F_6(PD(S_n))_{a6} \end{array} \right.$$

where:

an explanation is given in 10.Synthesis

Fig. 37 An alpha numeric model of visual assessment methods

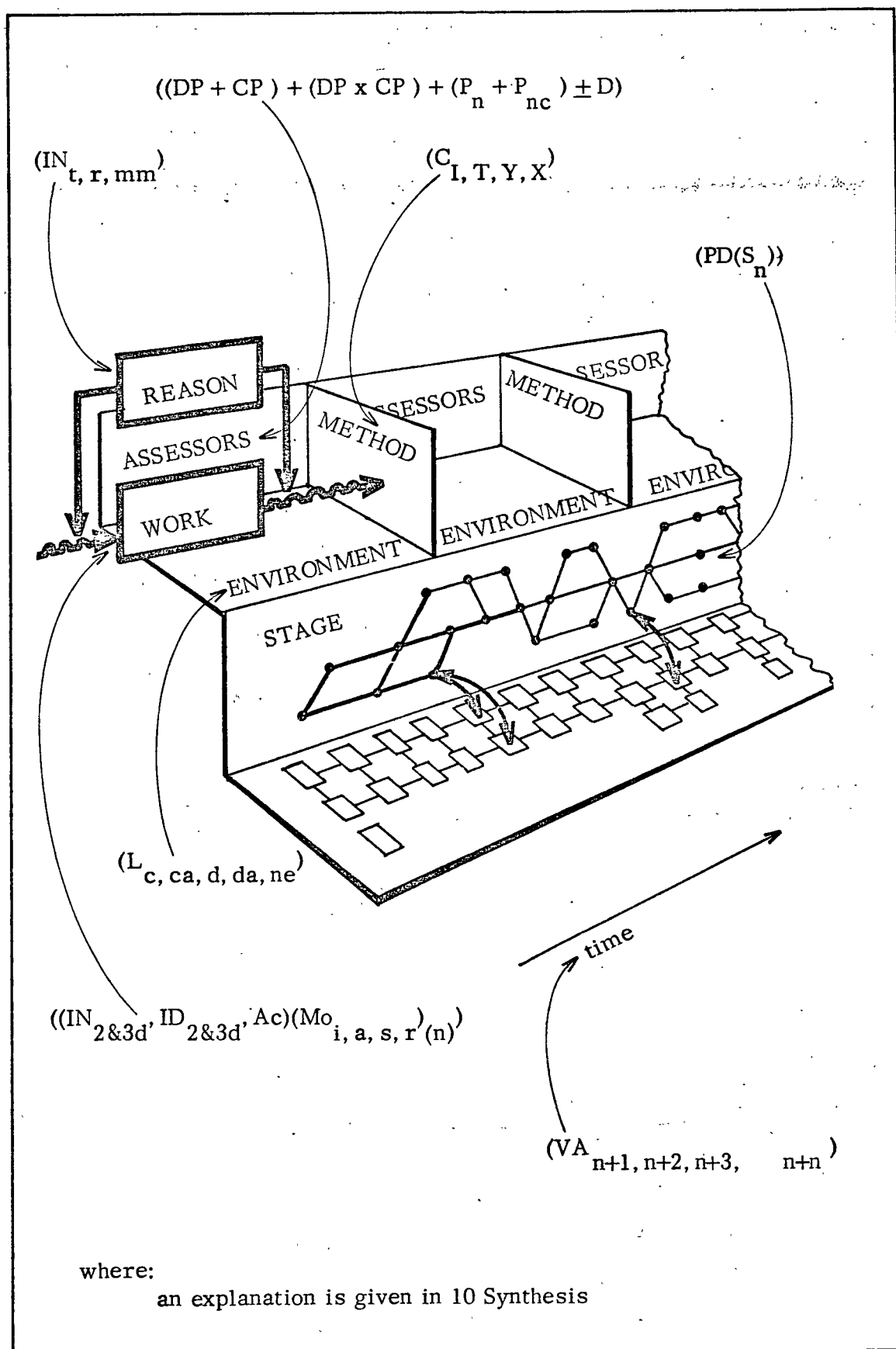


Fig. 38 An alpha numeric and illustrative model of visual assessment methods

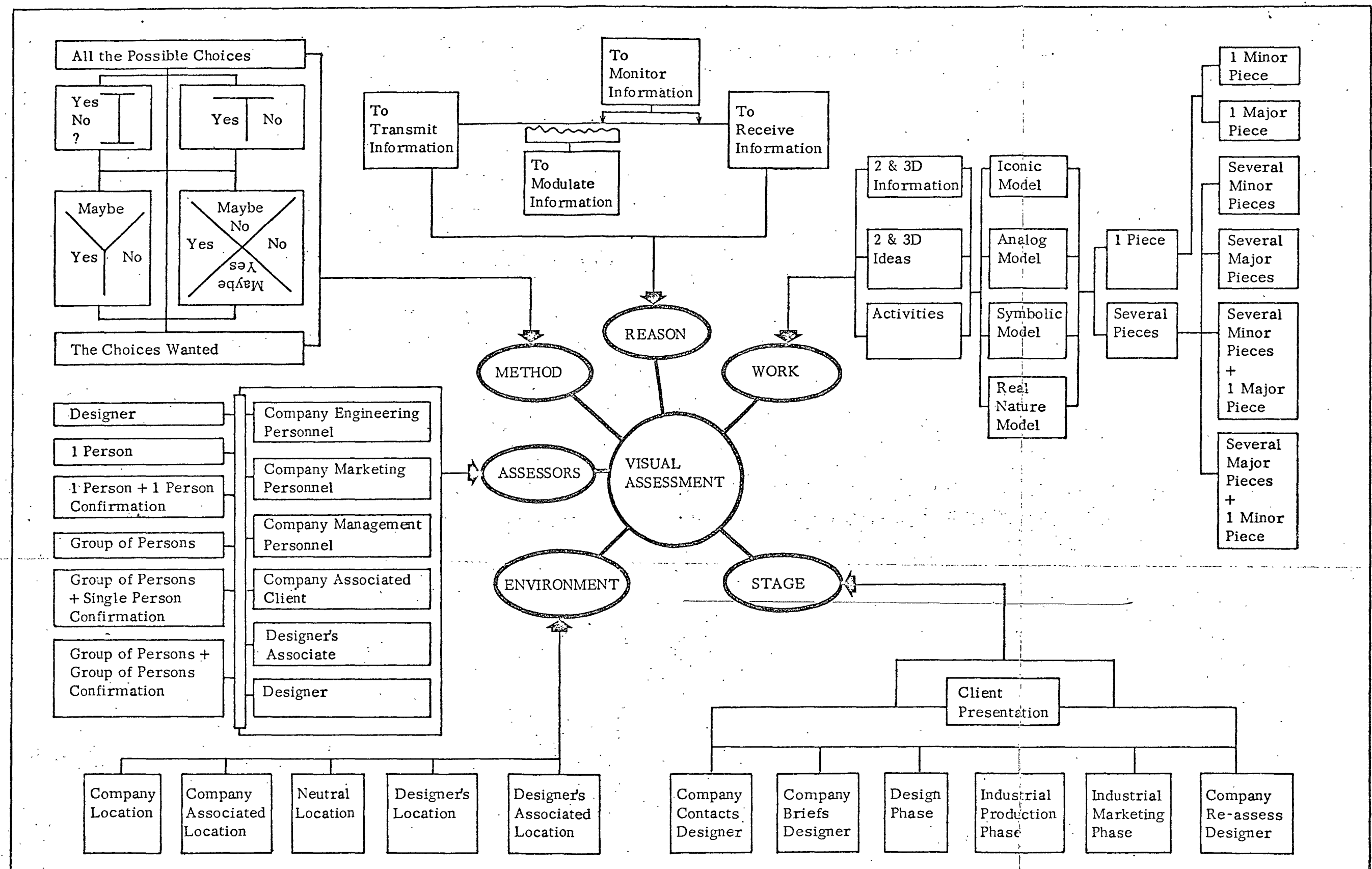


Fig. 39 A block diagram model of visual assessment methods

11.3 While reconsidering the field data the author was made aware of the following points:-

11.3.1 The case study data presented are unique in industrial design consultancy at the present time but there are a number of limitations inherent in them. These limitations obviously could also affect the validity of the models derived from the analysis. Any future readers who may wish to use the case study data, or apply the theoretical models, should be aware of these limitations.

11.3.2 The heart of the problem in collecting case study data is the validity and reliability of the observer and his method. The propositions are either intense participation and personal subjectivity or non-involvement and personal objectivity.

In collecting data the observer has to:

1. Accumulate as much data as possible
2. Not influence that data and data source in obtaining it.

If the observer becomes too involved he may collect additional data but he will begin to subjectively bias that data. The data may become valid but unreliable. Conversely if the observer is less involved he may fail to collect sufficient data, however, the data he does collect will be subjectively unbiased. The data may become reliable but invalid.

11.3.3 All the case histories sampled were practised by the author, collated by the author, and analysed by the author, and this will obviously add a subjective bias by the author to the results. The author tried to compensate for this by calibrating his research results against established data, however, the established data were thin and the calibration could be suspect.

11.3.4 No weighting was given to the consideration of the personality of the personnel involved in the sampling. It could be considered that an extreme weak or strong personality could have biased the results.

For example in presentation for assessment the personality of the designer as demonstrated by his confidence and competence in his presentation techniques

Should be further considered and also the receptiveness of his audience.

Obviously an audience with an hostile attitude to the designer will create extra difficulties during the visual assessment.

In the visual assessment model, (Fig.37) the author would consider personality to be implicit in the presence or absence of the personnel in that line devoted to the assessors. Any further data would form a subsection to this line.

11.3.5 Also no weighting was given to the degree of commitment involved to derive a satisfactory design solution. It could be considered that the commitment of the designer to the design service he is providing and the commitment of the company to derive a satisfactory product would have further biased the results.

For example if the designer were at the beginning of his career in industrial design consultancy the need to produce a 'good' design to satisfy his industrial clients and enhance his career prospects would intensify his commitment to the success of the design solution that he is presenting. Alternatively, if the designer was at the peak of his career in industrial design consultancy then the need to produce yet another 'good' design to satisfy yet another industrial client may result in a lower drive incentive to the commitment for the success of his design solution.

In the visual assessment model, (Fig.37) the author would consider the amount of commitment involved to be a subsection of that line devoted to the assessors.

11.3.6 On any further similar case study investigation the author would recommend the use of standard personality inventories as a matter of form. Although it is appreciated that the act of gathering the personality inventories would contaminate the sample group and bias the data accordingly.

11.3.7 The author would further recommend that any future investigator using a case study approach to industrial design consultancy should consider experimenting with a different approach to his task.

For example the investigator may decide to carry out his field studies in a

role other than that of the principal industrial design consultant concerned. He may also decide to use more than one industrial design consultant, and a greater variety of product types from different companies.

Consideration should be given to an investigation of the practice of an industrial design consultancy from the viewpoint of his industrial clients, although the author appreciated the difficulties in obtaining case study information on this type of employment from industrial sources.

11.3.8 In industrial design the practice is concerned with qualifiable data rather than quantifiable data, and with visual data rather than numerical data. As will be appreciated qualifiable visual data is difficult to collect and collate compared with quantifiable numerical data.

Handling qualifiable visual data is one of the major problems we are faced with in industrial design research.

## 12. APPENDICES

### 12.1 References

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## 12.2 Detailed Analysis of the Case Studies

12.2.1 The subject of the visual assessments in the case studies sequentially are:-

- 1.1 Existing range of products
- 1.2 Colour cards
- 1.3 Colour cards
- 1.4 Displayed colour cards
- 1.5 Colour cards
- 1.6 Displayed colour schemes
- 1.7 Displayed colour schemes
- 1.8 Prototype appearance model
- 1.9 Prototype appearance model and possibly other designs
- 2.1 Existing range of company products
- 2.2 Design options on a diagram
- 2.3 Coloured full size block models
- 2.4 Cardboard appearance models
- 2.5 Cardboard appearance models
- 2.6 Cardboard appearance models
- 2.7 A finished appearance model
- 2.8 A finished appearance model
- 3.1 Existing products, manufacturers' brochures and product planning charts
- 3.2 Design matrices drawings
- 3.3 12 appearance drawings
- 3.4 12 appearance drawings
- 3.5 Design drawings
- 3.6 3 cardboard models
- 3.7 4 cardboard models
- 3.8 Design drawings
- 3.9 2 cardboard models
- 3.10 A cardboard model
- 4.1 A selection of colour cards
- 4.2 16 colour permutation models
- 4.3 Pre-production model
- 4.4 Pre-production model
- 4.5 An appearance model
- 4.6 An appearance model + new construction model
- 4.7 2 structural models
- 4.8 2 structural models

- 4.9 16 colour permutation models
- 4.10 A structural model
- 4.11 A structural model
- 4.12 Pre-production model
- 4.13 Colour samples
- 5.1 An existing company product
- 5.2 2 appearance models
- 5.3 2 appearance models
- 6.1 An existing company product
- 6.2 An existing company product
- 6.3 3 appearance models
- 7.1 A photoanalysis of the existing product and a sheet of design proposals
- 7.2 A photoanalysis of the existing product and a sheet of design proposals
- 7.3 A dummy product
- 7.4 A dummy product
- 7.5 A dummy product
- 7.6 A dummy product and artwork
- 7.7 An existing product
- 7.8 A dummy product and artwork
- 8.1 Existing company product
- 8.2 Design drawings and 2 appearance models
- 8.3 2 appearance models
- 8.4 An appearance model
- 9.1 Graphic design drawings
- 9.2 Graphic design drawings
- 9.3 A report
- 9.4 A report
- 9.5 Design sketches
- 9.6 Graphic design sketches
- 9.7 Graphic simulations
- 9.8 Production simulations
- 9.9 Product simulations
- 10.1 Design sketches and models
- 10.2 Design sketches and models
- 11.1 Existing company product
- 11.2 Existing company product and design sketches
- 11.3 An appearance model
- 11.4 Finished model

- 11.5 Finished model
- 12.1 Existing company model
- 12.2 Existing company product, competitor product and design sketches
- 12.3 Finished appearance model
- 12.4 Finished appearance model
- 12.5 Finished appearance model
- 13.1 Drawings on graph paper
- 13.2 Drawings on graph paper
- 13.3 Print-out from a machine
- 13.4 Actual machine print-out, photoenlargements and graphic representations
- 13.5 Actual machine print-out, photoenlargements and graphic representations
- 13.6 Drawings on graph paper
- 13.7 Drawings and patterns on graph paper
- 14.1 Existing product housing, prototype product, engineering drawings
- 14.2 Engineering drawings + design sketches
- 14.3 Design and engineering drawings
- 14.4 Engineering drawings, design matrix drawings, volume and idea models
- 14.5 Engineering drawings, design matrix drawings, volume and idea models
- 14.6 Wooden models and ergonomic aspects
- 14.7 Volume and assembly models
- 14.8 Volume models
- 14.9 Volume models and logic diagrams
- 14.10 Volume models, logic diagrams and ergonomic simulations
- 14.11 Prototype model drawings
- 14.12 Prototype model drawings
- 15.1 Existing company products
- 15.2 Presentation drawings + 2 volume models
- 15.3 Presentation drawings + 2 volume models
- 15.4 Presentation drawings + 2 volume models
- 15.5 Presentation drawings + 2 volume models
- 15.6 Design drawings
- 15.7 Design drawings
- 15.8 Presentation drawings + 2 cardboard models

- 15.9 Presentation drawings + 2 cardboard models
- 15.10 Design drawings
- 15.11 Design drawings
- 15.12 2 finished appearance models
- 15.13 2 finished appearance models
- 15.14 2 finished appearance models
- 16.1 Design analysis sketches
- 16.2 Appearance models
- 16.3 Finished models
- 16.4 Design diagrams
- 16.5 Finished appearance models
- 16.6 Appearance models
- 16.7 Finished life size drawings
- 16.8 Finished life size drawings
- 16.9 Design detail drawings
- 16.10 2 appearance models
- 17.1 Existing product range
- 17.2 Design diagram sketches
- 17.3 Design drawings
- 17.4 Finished models
- 17.5 Presentation models and written specifications
- 17.6 Finished models
- 18.1 Sketches and components
- 18.2 Existing products
- 18.3 Design sketches
- 18.4 Cardboard model
- 18.5 Cardboard model
- 18.6 Existing components and sketches
- 18.7 Design sketches and cardboard models
- 18.8 8 cardboard models
- 18.9 A finished cardboard model
- 18.10 Several rough cardboard models
- 18.11 Sophisticated cardboard model
- 18.12 Design sketches
- 18.13 2 sophisticated cardboard models
- 18.14 2 sophisticated cardboard models
- 18.15 Design sketches and components
- 18.16 Design sketches and cardboard models
- 18.17 2 cardboard models
- 18.18 Sketches on paper

- 18.19 Design sketches, components and cardboard models
- 18.20 Design sketches and cardboard models
- 18.21 Design sketches and cardboard models
- 18.22 Design sketches and a cardboard model
- 18.23 Working prototype model
- 18.24 General appearance models
- 18.25 Engineering drawings and cardboard model
- 18.26 Design sketches
- 18.27 Block model
- 18.28 Design sketches + block model
- 18.29 Design sketches + components
- 18.30 Design sketches + components
- 18.31 Design sketches + components
- 18.32 Artwork
- 18.33 Artwork + components
- 18.34 Finished appearance model
- 18.35 Finished appearance model
- 18.36 Finished appearance model
- 19.1 Design sketches
- 19<sup>1</sup>/<sub>2</sub> 2 Appearance model
- 19.3 Appearance model
- 20.1 Sketches + existing prototypes
- 20.2 Design sketches
- 20.3 Constructed displays
- 20.4 Constructed displays

This may be summarised as:-

- 1. 2 and 3 dimensional information
- 2. 2 and 3 dimensional ideas
- 3. Activities

12.2.2 The reasons for the case study visual assessments sequentially are:-

1.1 To examine the present market, discuss improvements and brief the designer

1.2 To check design options

1.3 To check the work before a client presentation

1.4 To present the work and seek instructions

1.5 To make design decisions

1.6 To present the work and seek instructions

1.7 To assess the work to date

1.8 To present the work, seek approval and instructions

1.9 To present the work and discuss future product planning

2.1 To examine the existing market and brief the designer

2.2 To select design options

2.3 To check design decisions

2.4 To check the work before a client presentation

2.5 To present the work, to seek approval and instructions

2.6 To present the work, to seek approval and instructions

2.7 To check the work before a client presentation

2.8 To present the work, to seek approval and instructions

3.1 To examine the present market and brief the designer

3.2 To select design options

3.3 To check the work before a client presentation

3.4 To present the work, to seek approval and instructions

3.5 To select and check design decisions

3.6 To check the work before a client presentation

3.7 To present the work, to seek approval and instructions

3.8 To select design options

3.9 To check the work before a client presentation

3.10 To present the work, to seek approval and instructions

4.1 To select design options

4.2 To check the work before a client presentation

4.3 To assess the work of company engineers

4.4 To examine the work of the company engineers and discover design options

4.5 To check the work before a client presentation

4.6 To present the work, seek approval and instructions

4.7 To check the work before a client presentation

4.8 To present the work, to seek approval and instructions

4.9 To gather design data

- 4.10 To check the work before a client presentation
- 4.11 To present the work, to seek approval and instructions
- 4.12 To present the work and seek approval
- 4.13 To check design and production tolerances
- 5.1 To examine the existing product and brief the designer
- 5.2 To check the work before a client presentation
- 5.3 To present the work, to seek approval and instructions
- 6.1 To examine the present product and brief the designer
- 6.2 To examine the present product and decide what to do
- 6.3 To present the work, seek approval and instructions
- 7.1 To examine the existing product and design options
- 7.2 To present the work, seek approval and instructions
- 7.3 To check the work before a client presentation
- 7.4 To present the work, seek approval and instructions
- 7.5 To present the work, seek approval and instructions
- 7.6 To present the work, seek approval and instructions
- 7.7 To present the work and receive instructions
- 7.8 To present the work, seek approval and instructions
- 8.1 To examine the present product and brief the designer
- 8.2 To check the work before a client presentation
- 8.3 To present the work, seek approval and instructions
- 8.4 To check the work before a client presentation
- 9.1 To check the work before a client presentation
- 9.2 To present the work, seek approval and instructions
- 9.3 To check the work before a client presentation
- 9.4 To examine the work, seek approval and instructions
- 9.5 To check the work and make decisions
- 9.6 To present the work and seek future development
- 9.7 To check the work
- 9.8 To check the work before a client presentation
- 9.9 To present the work, seek approval and instructions
- 10.1 To check the work before a client presentation
- 10.2 To present the work, seek approval and instructions
- 11.1 To examine the present product and brief the designer
- 11.2 To select design options
- 11.3 To assess the work before a client presentation
- 11.5 To present the work, seek approval and instructions
- 12.1 To examine the present product and brief the designer
- 12.2 To select design options

- 12.3 To check the work before a client presentation
- 12.4 To present the work and seek approval
- 12.5 To present the work to company personnel and discuss the future
- 13.1 To examine design proposals
- 13.2 To select design options
- 13.3 To examine the design implementations
- 13.4 To check the work before a client presentation
- 13.5 To present the work, reduce the design options and receive instructions
- 13.6 To check the work before a client presentation
- 13.7 To check the work before a client presentation
- 14.1 To examine the present work and brief the designer
- 14.2 To examine the design options
- 14.3 To examine the design options
- 14.4 To check the work before a client presentation
- 14.5 To present the work, seek approval and instructions
- 14.6 To examine the work done and specify future work
- 14.7 To examine the work before a client presentation
- 14.8 To examine the work and specify future work
- 14.9 To examine the work and specify future work
- 14.10 To examine the work and specify future work
- 14.11 To examine the work to date
- 14.12 To examine the work to date
- 15.1 To examine the existing product and brief the designer
- 15.2 To check the work before a client presentation
- 15.3 To present the work, seek approval and instructions
- 15.4 To check the work before a client presentation
- 15.5 To present the work, seek approval and instructions
- 15.6 To check the work before production
- 15.7 To present the work for production
- 15.8 To check the work before a client presentation
- 15.9 To present the work, seek approval and instructions
- 15.10 To check the work before production
- 15.11 To present the work for production
- 15.12 To examine the work before acceptance
- 15.13 To check the work before a client presentation
- 15.14 To present the work, seek approval and instructions
- 16.1 To examine the work to date



- 16.2 To check the work before a client presentation
- 16.3 To present the work, seek approval and instructions
- 16.4 To examine the design options
- 16.5 To check the work before a client presentation
- 16.6 To present the work, seek approval and instructions
- 16.7 To check the work before a client presentation
- 16.8 To present the work, seek approval and instructions
- 16.10 To present the work, seek approval and instructions
- 17.1 To examine the present market
- 17.2 To examine design options
- 17.3 To check the work before production
- 17.4 To check the work before acceptance
- 17.5 To check the work before a client presentation
- 17.6 To present the work, seek approval and instructions
- 18.1 To examine design proposals, components and brief the designer
- 18.2 To examine existing products and brief the designer
- 18.3 To examine the design options
- 18.4 To check the work before a client presentation
- 18.5 To present the work, seek approval and instructions
- 18.6 To examine design data and receive instructions
- 18.7 To check the work before a client presentation
- 18.8 To present the work, seek approval and instructions
- 18.9 To present the work and seek approval
- 18.10 To check the work
- 18.11 To present the work, seek approval and instructions
- 18.12 To examine the existing work and brief the designer
- 18.13 To present the work, seek approval and instructions
- 18.14 To present the work, seek approval and instructions
- 18.15 To examine the existing design
- 18.16 To check the work before a client presentation
- 18.17 To present the work, seek approval and instructions
- 18.18 To check the work before a client presentation
- 18.19 To examine the work to date
- 18.20 To check the work before a client presentation
- 18.21 To present the work, seek approval and instructions
- 18.22 To present the work, seek approval and instructions
- 18.23 To examine the work of company engineers
- 18.24 To check the work before production
- 18.25 To present the work for production

- 18.26 To check the work
- 18.27 To check the work before acceptance
- 18.28 To present the work, seek approval and instructions
- 18.29 To check the work before production
- 18.30 To present the work for production
- 18.31 To present and examine the work before production
- 18.32 To check the work before production
- 18.33 To present the work for production
- 18.34 To check the work before acceptance
- 18.35 To present the work, seek approval and instructions
- 18.36 To present the work, seek approval and instructions
- 19.1 To examine the design options
- 19.2 To check the work before a client presentation
- 19.3 To present the work, seek approval and instructions
- 20.1 To examine the present products and brief the designer
- 20.2 To examine the design options
- 20.3 To examine and check the work before a client presentation
- 20.4 To present the work, seek approval and instructions

This may be summarised as:-

To examine existing situations

To brief the designer

To check the design progression

To make decisions

To check before a client presentation

To present the work, seek approval and instructions

To check work other than the designer's

12.2.3 The personnel involved in the case study visual assessments sequentially are:-

- 1.1 Industrial Designer + 5 marketing men
- 1.2 Industrial Designer
- 1.3 Industrial Designer
- 1.4 Industrial Designer + 5 marketing men
- 1.5 Industrial Designer
- 1.6 Industrial Designer
- 1.7 Industrial Designer + associates + 2 marketing men
- 1.8 Industrial Designer + 2 marketing men
- 1.9 Company personnel
- 2.1 Industrial Designer + 3 marketing men
- 2.2 Industrial Designer
- 2.3 Industrial Designer + 2 marketing men
- 2.4 Industrial Designer
- 2.5 Industrial Designer + 1 marketing man
- 2.6 Industrial Designer + 3 marketing men
- 2.7 Industrial Designer
- 2.8 Industrial Designer + 3 marketing men
- 3.1 Industrial Designer + 2 marketing men
- 3.2 Industrial Designer
- 3.3 Industrial Designer
- 3.4 Industrial Designer + 2-4 marketing men
- 3.5 Industrial Designer
- 3.6 Industrial Designer
- 3.7 Industrial Designer + 2 engineers + 2 marketing men
- 3.8 Industrial Designer
- 3.9 Industrial Designer
- 3.10 Industrial Designer + 2 marketing men
- 4.1 Industrial Designer + 1 associate
- 4.2 Design studio personnel
- 4.3 Industrial Designer + 1 associate + 2 engineers  
+ 1 marketing man
- 4.4 Industrial Designer + 3 associated + 1 company  
manager
- 4.5 Design office personnel
- 4.6 Industrial Designer + 3 associates + 1 manager  
+ 4 engineers + 3 marketing men
- 4.7 Design studio personnel
- 4.8 Industrial Designer + 3 associates + 3 engineers
- 4.9 Company engineers

- 4.10 Design studio personnel
- 4.11 Industrial Designer + 3 associates + 3 engineers
- 4.12 Industrial Designer + 1 marketing man
- 4.13 Industrial Designer
- 5.1 Industrial Designer + 2 associates + 4 engineers
- 5.2 Industrial Designer + associate
- 5.3 Industrial Designer + 1 engineer
- 6.1 Industrial Designer + 2 associates + 5 engineers
- 6.2 Industrial Designer + associates
- 6.3 Industrial Designer + 2 associates + 5 engineers
- 7.1 Industrial Designer
- 7.2 Industrial Designer + 1 assistant + 2 engineers  
+ 2 marketing men + a manager
- 7.3 Industrial Designer
- 7.4 Industrial Designer + 2 engineers
- 7.5 Industrial Designer + 2 engineers
- 7.6 Industrial Designer + 2 engineers
- 7.7 Industrial Designer + 2 engineers
- 7.8 Industrial Designer + 2 engineers
- 8.1 Industrial Designer + 2 engineers
- 8.2 Industrial Designer
- 8.3 Industrial Designer + 1 engineer
- 8.4 Industrial Designer
- 9.1 Industrial Designer
- 9.2 Industrial Designer + 1 manager
- 9.3 Industrial Designer + associates
- 9.4 Industrial Designer + 1 manager
- 9.5 Industrial Designer
- 9.6 Industrial Designer + 1 associated engineer
- 9.7 Industrial Designer
- 9.8 Industrial Designer + associate
- 9.9 Industrial Designer + 1 manager
- 10.1 Industrial Designer
- 10.2 Industrial Designer + 1 engineer
- 11.1 Industrial Designer + 3 marketing men
- 11.2 Industrial Designer
- 11.3 Industrial Designer
- 11.4 Industrial Designer
- 11.5 Industrial Designer + 3 marketing men
- 12.1 Industrial Designer + 1 engineer + 1 marketing man

+ 1 manager

- 12.2 Industrial Designer
- 12.3 Industrial Designer
- 12.4 Industrial Designer + 1 marketing man
- 12.5 Unknown company personnel
- 13.1 Industrial Designer + 1 associate + 1 manager
- 13.2 Industrial Designer + 1 associate
- 13.3 Industrial Designer + 1 associate + 1 engineer
- 13.4 Industrial Designer + associate
- 13.5 Industrial Designer + 1 associate + 1 manager  
+ 1 client manager + 1 client engineer
- 13.6 Industrial Designer + associate
- 13.7 Industrial Designer + associate
- 14.1 Industrial Designer + 2 associates + 7 engineers
- 14.2 Industrial Designer + associates
- 14.3 Industrial Designer + 3 associates
- 14.4 Industrial Designer + 3 associates
- 14.5 Industrial Designer + 2 associates + 7 engineers
- 14.6 Industrial Designer + 1 associate + 2 engineers
- 14.7 Industrial Designer
- 14.8 Industrial Designer + 2 associates + 2 engineers
- 14.9 Industrial Designer + 2 associates + 2 engineers
- 14.10 Industrial Designer + 2 associates + 2 engineers
- 14.11 Industrial Designer + 1 engineer
- 14.12 Industrial Designer + 1 engineer
- 15.1 Industrial Designer + 3 marketing men
- 15.2 Industrial Designer
- 15.3 Industrial Designer + 4 marketing men
- 15.4 Industrial Designer
- 15.5 Industrial Designer + 2 marketing men
- 15.6 Industrial Designer
- 15.7 Industrial Designer + Modelmaker
- 15.8 Industrial Designer
- 15.9 Industrial Designer + 2 marketing men
- 15.10 Industrial Designer
- 15.11 Industrial Designer + Modelmaker
- 15.12 Industrial Designer + Modelmaker
- 15.13 Industrial Designer
- 15.14 Industrial Designer + 3 marketing men
- 16.1 Industrial Designer

- 16.2 Industrial Designer
- 16.3 Industrial Designer + 1 associated designer + 1 design co-ordinator + 1 engineer + 2 marketing men
- 16.4 Industrial Designer
- 16.5 Industrial Designer
- 16.6 Industrial Designer + 1 associate + 1 engineer + 2 marketing men
- 16.7 Industrial Designer
- 16.8 Industrial Designer + 3 engineers + 2 marketing men
- 16.9 Industrial Designer
- 16.10 Industrial Designer + 1 engineer + 3 marketing men
- 17.1 Industrial Designer
- 17.2 Industrial Designer
- 17.3 Industrial Designer
- 17.4 Industrial Designer + Modelmaker
- 17.5 Industrial Designer
- 17.6 Industrial Designer + 2 engineers + 2 marketing men
- 18.1 Industrial Designer + 1 engineer
- 18.2 Industrial Designer + 2 engineers + 1 marketing man + 1 manager
- 18.3 Industrial Designer
- 18.4 Industrial Designer
- 18.5 Industrial Designer + 1 engineer + 1 manager
- 18.6 Industrial Designer + 2 engineers + 1 manager
- 18.7 Industrial Designer
- 18.8 Industrial Designer + 1 engineer + 2 marketing men + 1 manager
- 18.9 Industrial Designer + 1 marketing man
- 18.10 Industrial Designer
- 18.11 Industrial Designer + 1 engineer + 1 manager
- 18.12 Industrial Designer + 2 engineers
- 18.13 Industrial Designer + 1 engineer + 1 manager
- 18.14 Industrial Designer + 2 engineers + 2 marketing men + 1 manager
- 18.15 Industrial Designer + 2 engineers
- 18.16 Industrial Designer
- 18.17 Industrial Designer + 1 engineer + 1 marketing man
- 18.18 Industrial Designer
- 18.19 Industrial Designer + 1 associate + 2 engineers
- 18.20 Industrial Designer

- 18.21 Industrial Designer + 1 associate + 2 engineers
- 18.22 Industrial Designer + 2 engineers + 1 marketing man  
+ 1 manager
- 18.23 Industrial Designer + 3 engineers
- 18.24 Industrial Designer
- 18.25 Industrial Designer + Modelmaker
- 18.26 Industrial Designer
- 18.27 Industrial Designer + Modelmaker
- 18.28 Industrial Designer + 3 engineers
- 18.29 Industrial Designer
- 18.30 Industrial Designer + Modelmaker
- 18.31 Industrial Designer + engineer
- 18.32 Industrial Designer
- 18.33 Industrial Designer + Modelmaker
- 18.34 Industrial Designer + Modelmaker
- 18.35 Industrial Designer + 1 associate + 1 engineer
- 18.36 Industrial Designer + 1 associate + 2 engineers  
+ 2 marketing men + 1 manager
- 19.1 Industrial Designer
- 19.2 Industrial Designer
- 19.3 Industrial Designer + 1 engineer
- 20.1 Industrial Designer + 1 associate + 1 manager
- 20.2 Industrial Designer
- 20.3 Industrial Designer
- 20.4 Industrial Designer + 1 associate + 1 engineer  
+ 1 manager

This may be summarised as:-

- 1. Industrial Designer
- 2. Industrial Designer's associates
- 3. Company management
- 4. Company marketing
- 5. Company engineers
- 6. Company's client management
- 7. Company's client engineering

12.2.4 The environments of the visual assessments in the case studies sequentially are:-

1.1 Company conference room

1.2 Design studio

1.3 Design studio

1.4 Company office

1.5 Design studio

1.6 Company office

1.7. Company office

1.8 Company office

1.9 Company location

2.1 Company location

2.2 Design studio

2.3 Company office

2.4 Design studio

2.5 Company office

2.6 Company office

2.7 Design studio

2.8 Company office

3.1 Company office

3.2 Design studio

3.3 Design studio

3.4 Company office

3.5 Design studio

3.6 Design studio

3.7 Company location

3.8 Design studio

3.9 Design studio

3,10 Company office

4.1 Design studio

4.2 Design studio

4.3 Company office

4.4 Design studio

4.5 Design studio

4.6 Company conference room

4.7 Design studio

4.8 Company foyer room

4.9 Company location

4.10 Design studio

4.11 Company location



4.12 Hired conference room  
4.13 Colour science laboratory  
5.1 Company conference room  
5.2 Design studio  
5.3 Design studio  
6.1 Company conference room  
6.2 Design studio  
6.3 Company conference room  
7.1 Design studio  
7.2 Company office  
7.3 Design studio  
7.4 Company office  
7.5 Company office  
7.6 Company office  
7.7 Company office  
7.8 Company office  
8.1 Design studio  
8.2 Design studio  
8.3 A motel  
8.4 Design studio  
9.1 Design studio  
9.2 Company office  
9.3 Design studio  
9.4 Company office  
9.5 Design studio  
9.6 Computer office  
9.7 Design studio  
9.8 Design studio  
9.9 Company office  
10.1 Design studio  
10.2 Company laboratory  
11.1 Company conference room  
11.2 Design studio  
11.3 Design studio  
11.4 Design studio  
11.5 Company office  
12.1 Company office  
12.2 Design studio  
12.3 Design studio

- 12.4 Marketing man's house
- 12.5 Unknown company location
- 13.1 Company office
- 13.2 Design studio
- 13.3 Company laboratory
- 13.4 Design studio
- 13.5 Client office
- 13.6 Design studio
- 13.7 Company office
- 14.1 Company conference room
- 14.2 Design studio
- 14.3 Design studio conference room
- 14.4 Design studio
- 14.5 Company conference room
- 14.6 Company conference room
- 14.7 Design studio
- 14.8 Company conference room
- 14.9 Company conference room
- 14.10 Company conference room
- 14.11 Company drawing office
- 14.12 Company drawing office
- 15.1 Company office
- 15.2 Design studio
- 15.3 Company office
- 15.4 Design studio
- 15.5 Company office
- 15.6 Design studio
- 15.7 Modelmaker's studio
- 15.8 Design studio
- 15.9 Company office
- 15.10 Design studio
- 15.11 Modelmaker's studio
- 15.12 Modelmaker's studio
- 15.13 Design studio
- 15.14 Company office
- 16.1 Design studio
- 16.2 Design studio
- 16.3 Company office
- 16.4 Design studio
- 16.5 Design studio

1.6 Company office  
16.7 Design studio  
16.8 Company office  
16.9 Design studio  
16.10 Company conference room  
17.1 Design studio  
17.2 Design studio  
17.3 Design studio  
17.4 Modelmaker's workshop  
17.5 Design studio  
17.6 Company conference room  
18.1 Company open plan office  
18.2 Company office  
18.3 Design studio  
18.4 Design studio  
18.5 Company open plan office  
18.6 Company office  
18.7 Design studio  
18.8 Company office  
18.9 Marketing man's house  
18.10 Design studio  
18.11 Company office  
18.12 Design studio  
18.13 Company office  
18.14 Company conference room  
18.15 Company location  
18.16 Design studio  
18.17 Company office  
18.18 Design studio  
18.19 Company conference room  
18.20 Design studio  
18.21 Company conference room  
18.22 Company conference room  
18.23 Company office  
18.24 Design studio  
18.25 Modelmaker's studio  
18.26 Design studio  
18.27 Modelmaker's studio  
18.28 Company office

- 18.29 Design studio
- 18.30 Modelmaker's studio
- 18.31 Public house
- 18.32 Design studio
- 18.33 Modelmaker's studio
- 18.34 Modelmaker's studio
- 18.35 Company office
- 18.36 Company office
- 19.1 Design studio
- 19.2 Design studio
- 19.3 Design studio
- 20.1 Company office
- 20.2 Design studio
- 20.3 Design studio
- 20.4 Company office

This may be summarised as :-

- 1. Company location
- 2. Company associated location
- 3. Designer's location
- 4. Designer's associated location
- 5. A neutral location

12.2.5 The method of visual assessment in the case studies sequentially are :-

- 1.1 By subjective appraisal + verbal comments
- 1.2 By subjective appraisal
- 1.3 By subjective appraisal
- 1.4 By subjective appraisal with verbal comments
- 1.5 By subjective appraisal with verbal comments
- 1.6 By subjective appraisal with verbal comments
- 1.7 By subjective appraisal with verbal comments
- 1.8 By subjective appraisal with verbal comments
- 1.9 Not known
- 2.1 By subjective appraisal with verbal directions
- 2.2 By subjective appraisal
- 2.3 By subjective appraisal with verbal directions
- 2.4 By subjective appraisal
- 2.5 By subjective appraisal with verbal directions
- 2.6 By subjective appraisal with verbal directions
- 2.7 By subjective appraisal
- 2.8 By subjective appraisal with verbal comments
- 3.1 By subjective appraisal with verbal directions
- 3.2 By subjective appraisal
- 3.3 By subjective appraisal
- 3.4 By subjective appraisal based on a consensus of verbal opinions.
- 3.5 By subjective appraisal
- 3.6 By subjective appraisal
- 3.7 By subjective appraisal with verbal discussions
- 3.8 By subjective appraisal
- 3.9 By subjective appraisal
- 3.10 By subjective appraisal with verbal comments
- 4.1 By subjective appraisal with verbal discussions
- 4.2 By subjective appraisal with verbal discussions
- 4.3 By subjective appraisal
- 4.4 By subjective appraisal with verbal comments
- 4.5 By subjective appraisal with verbal comments
- 4.6 By subjective appraisal with verbal comments
- 4.7 By subjective appraisal with verbal comments
- 4.8 By subjective appraisal with verbal discussions
- 4.9 By subjective appraisal survey
- 4.10 By subjective appraisal

- 4.11 By subjective appraisal with verbal discussions
- 4.12 By subjective appraisal with verbal discussions
- 4.13 By objective assessment
- 5.1 By subjective appraisal with verbal discussions
- 5.2 By subjective appraisal with verbal discussions
- 5.3 By subjective appraisal with verbal discussions
- 6.1 By subjective appraisal with verbal discussions
- 6.2 By subjective appraisal with verbal discussions
- 6.3 By subjective appraisal with verbal discussions
- 7.1 By subjective appraisal
- 7.2 By subjective appraisal with verbal comments
- 7.3 By subjective appraisal
- 7.4 By subjective appraisal with verbal discussions
- 7.5 By subjective appraisal with verbal comments
- 7.6 By subjective appraisal with verbal approvals
- 7.7 By subjective appraisal with verbal discussions
- 7.8 By subjective appraisal with verbal comments
- 8.1 By subjective appraisal with verbal discussions
- 8.2 By subjective appraisal
- 8.3 By subjective appraisal with verbal discussions
- 8.4 By subjective appraisal
- 9.1 By subjective appraisal
- 9.2 By subjective appraisal with verbal discussions
- 9.3 By subjective appraisal with verbal discussions
- 9.4 By subjective appraisal with verbal discussions
- 9.5 By subjective appraisal
- 9.6 By subjective appraisal with verbal discussions
- 9.7 By subjective appraisal
- 9.8 By subjective appraisal with verbal discussions
- 9.9 By subjective appraisal with verbal discussions
- 10.1 By subjective appraisal
- 10.2 By subjective appraisal and discussions
- 11.3 By subjective appraisal
- 11.4 By subjective appraisal
- 11.5 By subjective appraisal
- 12.1 By subjective appraisal and discussions
- 12.2 By subjective appraisal
- 12.3 By subjective appraisal
- 12.4 By subjective appraisal
- 12.5 Unknown

- 13.1 By subjective appraisal
- 13.2 By subjective appraisal and discussions
- 13.3 By subjective appraisal and discussions
- 13.4 By subjective appraisal and discussions
- 13.5 By subjective analytical appraisal with analytical discussions
- 13.6 By subjective detailed examination and discussion
- 13.7 By subjective appraisal of graphical details
- 14.1 By subjective appraisal and discussion
- 14.2 By subjective appraisal and discussions
- 14.3 By subjective appraisal and discussions
- 14.4 By subjective appraisal and discussions
- 14.5 By subjective appraisal and discussions
- 14.6 By subjective appraisal and discussions
- 14.7 By subjective appraisal
- 14.8 By subjective appraisal and discussions
- 14.9 By subjective appraisal and discussions
- 14.10 By subjective appraisal and discussions
- 14.11 By subjective appraisal and discussions
- 14.12 By subjective appraisal and discussions
- 15.1 By subjective appraisal and discussions
- 15.2 By subjective appraisal
- 15.3 By subjective appraisal and discussions
- 15.4 By subjective appraisal
- 15.5 By subjective appraisal and discussions
- 15.6 By subjective appraisal
- 15.7 By subjective appraisal and discussions
- 15.8 By subjective appraisal
- 15.9 By subjective appraisal and detailed discussions
- 15.10 By subjective appraisal
- 15.11 By subjective appraisal and discussions
- 15.12 By subjective appraisal and discussions
- 15.13 By subjective appraisal
- 15.14 By subjective appraisal and detailed discussions
- 16.1 By subjective appraisal
- 16.2 By subjective appraisal
- 16.3 By subjective appraisal and discussions
- 16.4 By subjective appraisal
- 16.5 By subjective appraisal
- 16.6 By subjective appraisal and verbal discussions

- 16.7 By subjective appraisal
- 16.8 By subjective appraisal and detailed discussions
- 16.9 By subjective appraisal
- 16.10 By subjective appraisal and detailed discussions
- 17.1 By subjective appraisal
- 17.2 By subjective appraisal
- 17.3 By subjective appraisal
- 17.4 By subjective appraisal and detailed discussions
- 17.5 By subjective appraisal
- 17.6 By subjective appraisal and detailed discussions
- 18.1 By subjective appraisal and detailed discussion
- 18.2 By subjective appraisal and detailed discussion
- 18.3 By subjective appraisal
- 18.4 By subjective appraisal
- 18.5 By subjective appraisal and verbal comment
- 18.6 By subjective appraisal and detailed discussion
- 18.7 By subjective appraisal
- 18.8 Subjective, but using a sophisticated decision process with verbal comments
- 18.9 By subjective appraisal with verbal comments
- 18.10 By subjective appraisal
- 18.11 By subjective appraisal and discussion
- 18.12 By subjective appraisal and detailed discussion
- 18.13 By subjective appraisal with verbal comment
- 18.14 By subjective appraisal and detailed discussions
- 18.15 By subjective appraisal and detailed discussions
- 18.16 By subjective appraisal
- 18.17 By subjective appraisal and detailed discussions
- 18.18 By subjective appraisal
- 18.19 By subjective appraisal and detailed discussions
- 18.20 By subjective appraisal
- 18.21 By subjective appraisal and detailed discussions
- 18.22 By subjective appraisal and verbal comments
- 18.23 By subjective appraisal and discussions
- 18.24 By subjective appraisal
- 18.25 By subjective appraisal and detailed discussions
- 18.26 By subjective appraisal
- 18.27 By subjective appraisal and verbal comment
- 18.28 By subjective appraisal and verbal comment
- 18.29 By subjective appraisal



12.2.6 The stages in the design process of the visual assessments in the case studies sequentially are:-

1.1 Briefing the designer at the beginning by Marketing

1.2 During a design process

1.3 Before a client presentation

1.4 A client presentation

1.5 During a design process

1.6 A client presentation

1.7 Briefing the designer

1.8 A client presentation

1.9 Company review

2.1 Briefing the designer at the beginning by Marketing

2.2 During a design process

2.3 During a design process

2.4 Before a client presentation

2.5 A client presentation

2.6 A client presentation

2.7 Before a client presentation

2.8 A client presentation

3.1 Briefing the designer at the beginning by Marketing

3.2 During a design process

3.3 Before a client presentation

3.4 A client presentation

3.5 During a design process

3.6 Before a client presentation

3.7 A client presentation

3.8 During a design process

3.9 Before a client presentation

3.10 A client presentation

4.1 During a design process

4.2 Before a client presentation

4.3 End of an engineering process

4.4 During a design process

4.5 Before a client presentation

4.6 A client presentation

4.7 Before a client presentation

4.8 A client presentation

4.9 During an engineering process

4.10 Before a client presentation

4.11 A client presentation

4.12 A client presentation and end of design phase

#### 4.13 Post-design phase

- 5.1 Briefing the designer at the beginning by Engineering
- 5.2 Before a client presentation
- 5.3 A client presentation
- 6.1 Briefing the designer at the beginning by Engineering
- 6.2 During a design process
- 6.3 A client presentation
- 7.1 During a design process
- 7.2 A client presentation
- 7.3 Before a client presentation
- 7.4 A client presentation
- 7.5 A client presentation
- 7.6 A client presentation
- 7.7 A client presentation
- 7.8 A client presentation
- 8.1 Briefing the designer at the beginning by Engineering
- 8.2 Before a client presentation
- 8.3 A client presentation
- 8.4 Before a client presentation
- 9.1 Before a client presentation
- 9.2 A client presentation
- 9.3 Before a client presentation
- 9.4 A client presentation
- 9.5 During a design process
- 9.6 A client presentation
- 9.7 During a design process
- 9.8 Before a client presentation
- 9.9 A client presentation
- 10.1 Before a client presentation
- 10.2 A client presentation
- 11.1 Briefing the designer at the beginning by Marketing
- 11.2 During a design process
- 11.3 Before a client presentation
- 11.4 Before a client presentation
- 11.5 A client presentation
- 12.1 Briefing the designer at the beginning by Management
- 12.2 During a design process
- 12.3 Before a client presentation
- 12.4 A client presentation
- 12.5 Company review

- 13.1 Briefing the designer at the beginning by Management
- 13.2 During a design process
- 13.3 During a design process
- 13.4 Before a client presentation
- 13.5 A client presentation
- 13.6 Before a client presentation
- 13.7 Before a client presentation
- 14.1 Briefing the designer at the beginning
- 14.2 During a design process
- 14.3 During a design process
- 14.4 Before a client presentation
- 14.5 A client presentation
- 14.6 During a design process
- 14.7 Before a client presentation
- 14.8 A client presentation
- 14.9 A client presentation
- 14.10 A client presentation
- 14.11 During a design process
- 14.12 During a design process
- 15.1 Briefing the designer at the beginning by Marketing
- 15.2 Before a client presentation
- 15.3 A client presentation
- 15.4 Before a client presentation
- 15.5 A client presentation
- 15.6 During a design process
- 15.7 During a design process
- 15.8 Before a client presentation
- 15.9 A client presentation
- 15.10 During a design process
- 15.11 During a design process
- 15.12 During a design process
- 15.13 Before a client presentation
- 15.14 A client presentation
- 16.1 During a design process
- 16.2 Before a client presentation
- 16.3 A client presentation
- 16.4 During a design process
- 16.5 Before a client presentation
- 16.6 A client presentation
- 16.7 Before a client presentation
- 16.8 A client presentation

- 16.9 Before a client presentation
- 16.10 A client presentation
- 17.1 During a design process
- 17.2 During a design process
- 17.3 During a design process
- 17.4 During a design process
- 17.5 Before a client presentation
- 17.6 A client presentation
- 18.1 Briefing the designer at the beginning
- 18.2 Briefing the designer
- 18.3 During a design process
- 18.4 Before a client presentation
- 18.5 A client presentation
- 18.6 Briefing the designer during a design process
- 18.7 Before a client presentation
- 18.8 A client presentation
- 18.9 A client presentation
- 18.10 During a client presentation
- 18.11 A client presentation
- 18.12 During a design process
- 18.13 A client presentation
- 18.14 A client presentation
- 18.15 During a design process
- 18.16 Before a client presentation
- 18.17 A client presentation
- 18.18 Before a client presentation
- 18.19 During a design process
- 18.20 Before a client presentation
- 18.21 A client presentation
- 18.22 A client presentation
- 18.23 During a design process
- 18.24 During a design process
- 18.25 During a design process
- 18.26 During a design process
- 18.27 During a design process
- 18.28 A client presentation
- 18.29 During a design process
- 18.30 During a design process
- 18.31 During a design process
- 18.32 During a design process
- 18.33 During a design process

- 18.34 During a design process
- 18.35 A client presentation
- 18.36 A client presentation
- 19.1 During a design process
- 19.2 Before a client presentation
- 19.3 A client presentation
- 20.1 Briefing the designer at the beginning by Management
- 20.2 During a design process
- 20.3 Before a client presentation
- 20.4 A client presentation

This may be summarised as:-

- 1. Briefing the designer at the beginning by Management
- 2. Briefing the designer at the beginning by Marketing
- 3. Briefing the designer at the beginning by Engineering
- 4. Before a client presentation
- 5. A client presentation
- 6. A design process
- 7. An engineering process
- 8. Re-briefing the designer
- 9. End of the design process

12.2.7 The additional analyses of the visual assessments in the case studies sequentially are:-

7.1.3 A flop meeting, the work presented was too timid

7.1.4 No check before a client presentation

7.1.5 No decision made at the time, the decision was deferred

7.1.7 No check before a client presentation

7.2.2 No check before a client presentation

7.2.3 No assessment took place although one was expected

7.2.7 No check before a client presentation

7.2.9 No check on the drawing issued to the Modelmaker

7.2.11 It could be presumed that the company made further visual assessments with the manufacturer

7.3.7 It could be presumed that the company made further visual assessments with engineering production

7.4.2 The assessment was not expected

7.4.5 No visual assessment occurred during this design appraisal stage

7.4.6 A flop meeting with a timid response from the client

7.5.2 No visual assessment occurred during this design appraisal stage

7.5.3 It could be presumed that the company made further visual assessments

7.6.2 No check before a client presentation

7.7.1 It should be assumed that the designer had made a visual assessment of the product previously

7.7.2 No check before a client presentation

7.7.6 No check before a client presentation

7.7.8 No check before a client presentation

7.7.10 It should be acknowledged that the company had made a visual assessment before calling in the designer

7.7.11 No check before a client presentation

7.7.13 It could be presumed that the company made a visual assessment of the product after production to check for themselves, as in 7.7.10

7.8.5 The work was not assessed by the client on presentation

7.9.8 It could be assumed that the company engineers assessed visually the work

7.9.9 It could be assumed that the company engineers assessed visually the work

7.10.3 The work was not assessed during the design development stage

7.105/6 It could be assumed that the engineers assessed visually the work with someone else

7.11.2 On checking the work before a client presentation it was found to be wrong, and re-done

7.11.4 It could be assumed that the company made a visual assessment at this stage

7.13.6 The work was not checked during design development or before a client presentation

7.13.8 The work was not checked during design development

7.13.9 It could be assumed that the client assessed visually the work

7.13.11 It could be assumed that the patent officer assessed visually the work

7.14.1 The assessment was not expected

7.14.10 The assessment was not expected

7.14.11 It could be assumed that the company assessed visually the work before production

7.15.2 No assessment was made during design development

7.15.11 It could be assumed that the Modelmaker made an assessment

7.15.13 It could be assumed that the Modelmaker made an assessment

7.15.15 It could be assumed that the company made a visual assessment

7.16.1 The examination of the design analysis was not a visual assessment

7.16.2 The size of the meeting increased during the assessment

7.16.3 The work was displayed before the meeting and presented gradually during the beginning of the meeting

7.16.5 The size of the meeting increased during the assessment

7.16.8 No assessment was made during design development

- 7.17.3 It could be assumed that the Modelmaker assessed the drawings and finished models before presentation
- 7.17.6 It could be assumed that the company assessed the work at a later date
- 7.18.3 There were two meetings and assessments in immediate sequence
- 7.18.6 It is implied that the company's Executive Director assessed the work
- 7.18.7 No assessment was made during design development
- 7.18.8 The designer had to clear a space on the desk for his models
- 7.18.9 No assessment was made before a client presentation
- 7.18.13 The final model was not assessed before a client presentation
- 7.18.15 The work was not assessed before a client presentation
- 7.18.17 There were two meetings and assessments in immediate sequence
- 7.18.19 It could be assumed that the company made an assessment before calling in the designer
- 7.18.20 The work was not assessed during design development
- 7.18.25 The work was presented even though the designer knew that the design solution was unsatisfactory
- 7.18.26 The work was not assessed before a client presentation
- 7.18.28 It could be assumed that the company assessed the work before calling in the designer
- 7.18.33 It could be assumed that the Modelmaker assessed the work before presentation
- 7.18.40 It could be assumed that the Modelmaker assessed the development of the work
- 7.18.41 It could be assumed that the Modelmaker assessed the development of the finished model before presentation
- 7.18.43 There were two meetings and assessments in immediate sequence
- 7.18.43 It could be assumed that the company assessed the work at a later date
- 7.20.5 It could be assumed that the company assessed the work at a later date



This may be summarised as:-

1. Unsuccessful meeting
2. No check or assessment when expected
3. Unexpected check or assessment
4. Company make a visual assessment before calling in a designer
5. Company make a visual assessment and do not inform the designer
6. Meeting increases in size during a presentation
7. Work displayed gradually during a presentation
8. Two meetings with assessment in immediate sequence
9. Designer has to clear a space for his work before a presentation

## 12.3 Detailed Analysis of the Desk Data.

12.3.1 The subject of the visual assessments listed in the desk data are:-

### 8.1.3 Consumer Products

8.1.3 Engineering products

8.1.6 Finished products without the coat of paint

8.2.1 Idea drawings

8.2.1 Successful and unsuccessful prototypes

8.2.2 Analysis models and illustrations

8.2.2 The product

8.2.2 Idea sketches

8.2.2 Rough clay models

8.2.2 Ergonomic assessments

8.2.2 Working drawings and pilot model

8.2.2 Prototype model and production model

8.3.1 Sketches

8.3.1 Renderings

8.3.1 Engineering drawings

8.3.1 Models

8.3.2 Pictorial drawings, models and illusioned engineering drawings and optically deceiving presentation drawings

8.3.3 Models and drawings

8.3.3 Diagrams illustrations, surveys, working drawings

8.3.4  $\frac{1}{4}$  scale sketches

8.3.4  $\frac{1}{2}$  scale model

8.3.4 Ergonomic aspects

8.3.4 Full size air brushed drawings

8.3.4 Photographs

8.3.4 Full size mock up and mirrored half model

8.3.4  $\frac{1}{4}$  scale finished model

8.3.4 Full size clay model

8.3.4 Fibre glass moulds and working prototypes

8.3.4 Detailed design and modelling components

8.3.4 Full size appearance mock-up

8.3.5 Rough visualisations

8.3.5 Renderings

8.3.5 Clay studies

8.3.5 Scale models

8.3.5 Mock-ups

8.3.5 Prototypes

- 8.3.5 Mechanical drawings
- 8.3.5 The existing machine in use
- 8.3.5 The existing machine at rest
- 8.3.5 First life scales
- 8.3.5 A study model
- 8.3.5 First renderings
- 8.3.5 Oversimplified renderings
- 8.3.5 Detailed renderings
- 8.3.5 Plaster presentation model
- 8.3.5 Clay modified model
- 8.3.5 Finished design
- 8.3.5 Consumer surveys
- 8.3.6 A form of words
- 8.3.6 Symbolic logic
- 8.3.6 Diagrams
- 8.3.6 Sketches
- 8.3.6 Formal drawings
- 8.3.6 Simple models
- 8.3.6 Working analogues
- 8.3.6 Prototypes
- 8.3.7 Functional visualisations with idea diagrams
- 8.3.7 Idea matrices and conceptual sketches
- 8.3.8 Iconic models
- 8.3.8 Analog models
- 8.3.8 Symbolic models
- 8.4.1 Research analyses
- 8.4.1 Preliminary sketches
- 8.4.1 Renderings
- 8.4.1 Mock-ups and prototypes
- 8.4.1 Design solutions
- 8.4.2 Design solutions
- 8.4.2 New design model
- 8.4.3 Ideas 8.4.3 design solutions
- 8.4.3 Flip charts media
- 8.4.3 Viewgraph media
- 8.4.3 Lantern slides media
- 8.4.3 Movie projector media
- 8.4.3 Mock-up media
- 8.4.3 Chalk board media
- 8.5.1 Battleaxed ideas

- 8.5.1 T chart characteristics
- 8.5.1 Decision matrix alternatives
- 8.5.1 Decision treed subjects
- 8.5.1 Optimised subjects
- 8.5.2 Checklist requirements
- 8.5.2 Selected criterion
- 8.5.2 Ranked and weighted alternative designs
- 8.5.2 Written specifications
- 8.5.2 Reliability indexed components
- 8.5.3 Criterion
- 8.5.3 Optimised procedures
- 8.5.4 Optimised terms
- 8.5.4 Engineering drawings
- 8.5.4 Mathematical equations
- 8.5.4 Criterion
- 8.5.5 Decision factors
- 8.5.6 Designs, built designs and calculated designs
- 8.5.6 Perceivable qualities
- 8.5.7 Eye observation data
- 8.5.7 Eye movement data
- 8.7.7 People's movements

This may be summarised as:-

1. Two and three dimensional information
2. Two and three dimensional ideas
3. Activities
4. Iconic, analog, symbolic models and actual nature

*get actual nature!*

12.3.2 The reason for the visual assessments listed in the desk data are:-

- 8.1.4 To check the making and performance of the product
- 8.1.4 To check the selling and promotion of the product
- 8.1.4 To check the overiewing and progress of the product
- 8.1.6 To check the design progress
- 8.1.6 To check before calling in the local industrial design consultant
- 8.1.6 To check the problem
- 8.1.6 To check the prototype
- 8.1.6 To check the selling
- 8.2.1 To check the profit
- 8.2.2 To study the competition
- 8.2.2 To familiarize themselves with the client's manufacturing facilities
- 8.2.2 To learn how the product will be used
- 8.2.2 To develop idea sketches
- 8.2.2 To study the design in three dimensions
- 8.2.2 To study the ergonomics
- 8.2.2 To collaborate with the client's engineers
- 8.2.2 To check the prototype model
- 8.3.1 To assess the G A drawing
- 8.3.1 To visualize alternative solutions
- 8.3.3 To diagnose
- 8.3.3 To determine and present conclusions
- 8.3.3 To prescribe instructions
- 8.3.5 To get consumer reactions
- 8.3.7 To visualize functionally
- 8.3.8 To check looks
- 8.3.8 To check behaviour
- 8.3.8 To check principles
- 8.4.1 To predict designs
- 8.4.1 To let the client exercise his prerogative of choosing
- 8.4.1 To placate the client
- 8.4.1 To check appeal for the customer
- 8.4.1 To check making
- 8.4.2 To present the design solutions
- 8.4.2 To display the new design model
- 8.4.3 To check the planning and preparing of a presentation

- 8.5.1 To evaluate the design
- 8.5.2 To evaluate or converge the designs
- 8.5.3 To optimise the designs
- 8.5.4 To assess the designs
- 8.5.4 To guide in making the best decisions
- 8.5.5 To make decisions
- 8.5.6 To evaluate the design
- 8.5.7 To assess stimuli situations

This may be summarised as:-

- 1. To examine existing situations
- 2. To brief the designer
- 3. To check the design progression
- 4. To make decisions
- 5. To check before a client presentation
- 6. To present the work, seek approval and instructions
- 7. To check work other than the designers
- 8. To check or seek information
- 9. To placate the client

12.3.3 The personnel listed in the desk data are:-

- 8.1.1 Single staff Industrial Designers
- 8.1.1 Group staff Industrial Designers
- 8.1.1 Single Consultant Industrial Designers
- 8.1.1 Group Consultant Industrial Designers
- 8.1.2 Impresario Industrial Designers
- 8.1.2 Culture diffuser Industrial Designers
- 8.1.2 Culture generator Industrial Designers
- 8.1.2 Assistant Industrial Designers
- 8.1.2 Parasite Industrial Designers
- 8.1.3 Product Industrial Designers
- 8.1.3 Consumer product Industrial Designers
- 8.1.3 Engineering product Industrial Designers
- 8.1.4 Engineering industrial personnel
- 8.1.4 Marketing industrial personnel
- 8.1.4 Management industrial personnel
- 8.1.6 Design management
- 8.1.6 Management consultants
- 8.1.6 Industrial Designers
- 8.1.6 Local Industrial Design consultants
- 8.1.6 Product design group practice personnel
- 8.1.6 Design consultants
- 8.2.2 Senior management, sales executives and engineers
- 8.2.2 Client's engineers
- 8.2.3 Consultant Industrial Designer
- 8.4.1 Full dress group of executives
- 8.4.1 Small groups of the product manager
- 8.4.1 Engineers and factory men
- 8.4.1 Executives of the client's organisation
- 8.4.1 Marketing
- 8.4.1 Engineering
- 8.4.1 Production management
- 8.4.2 Senior executives
- 8.4.2 Design manager
- 8.4.2 Chairman
- 8.5.2 Designers
- 8.5.2 Inexperienced designers
- 8.7.7 Ergonomists

This may be summarised as:-

1. Industrial Designer
2. Industrial Designer's associates
3. Company management
4. Company marketing
5. Company engineering



12.3.4 The types of environment listed in the desk data are:-

8.2.2 Client's manufacturing facilities

8.3.5 Halls

8.4.1 Assembly rooms or auditoria

8.4.1 Director's board room or permanent display room

8.4.3 Lighted and darkened rooms

This may be summarised as:-

1. Company location

2. A neutral location

12.3.5 The methods of visual assessment listed in the desk data are:-

- 8.1.2 By skimming of the cream
- 8.3.1 By producing an illusion
- 8.4.1 By client's prerogative of choice
- 8.4.1 By omniscient choice
- 8.4.1 By non-omniscient choice
- 8.4.1 By confusing and exasperating situations
- 8.4.1 By countering awkward questions
- 8.4.1 By long drawn out meetings
- 8.4.1 By human nature, personality clashes, company politics and humorous interludes
- 8.4.1 By has it appeal for the customer
- 8.4.1 By how shall we make it
- 8.4.1 By never apologising for the design
- 8.4.3 By knowledge and enthusiasm
- 8.4.3 By advantage and disadvantage pointing out
- 8.4.3 By accepting criticism
- 8.4.3 By arranging the presentation format
- 8.4.3 By keeping to schedule
- 8.4.3 By examination control
- 8.4.3 By selling and defending
- 8.5.1 By battleaxe
- 8.5.1 By T chart
- 8.5.1 By decision matrix
- 8.5.1 By decision trees
- 8.5.1 By optimisation
- 8.5.2 By checklist
- 8.5.2 By selection criteria
- 8.5.2 By ranking and weighting
- 8.5.2 By specification writing
- 8.5.2 By Quirk's Reliability Index
- 8.5.3 By decisions of optimization
- 8.5.4 By optimization
- 8.5.4 By subjective decisions
- 8.5.4 By rules-of-thumb
- 8.5.4 By graphical methods
- 8.5.4 By analytical methods
- 8.5.4/5 By decision matrices

- 8.5.6 By feasibility testing and actual assessment
- 8.5.6 By feasibility testing and paper testing
- 8.5.6 By descriptive aesthetics
- 8.5.6 By ethical aesthetics
- 8.5.6 By case law logic
- 8.5.7 By appeal, I like this
- 8.5.6 By appeal, I recognise that this conforms well to those criteria which are generally accepted to be the mark of good
- 8.5.6 By intuition
- 8.5.7 By objective eye observation cameras
- 8.5.7 By objective eye movement cameras
- 8.5.7 By objective time lapse cameras

This may be summarised as:-

1. By subjective appraisal
2. By subjective appraisal and verbal comments
3. By sophisticated subjective appraisal and verbal comments
4. By subjective appraisal and sophisticated verbal comments
5. By confusing subjective appraisal
6. By confusing subjective appraisal and confusing verbal comments
7. By objective assessment

12.3.6 The stages in the design process listed in the desk data are:-

8.1.2 Getting work

8.1.2 Organising others to do the work

8.1.2 Presenting the outcome

8.1.2 Doing the work

8.1.2 Producing ideas

8.1.3 Administration or draughting

8.1.3 Emphasising the appearance of the product

8.1.3 Emphasising the production of the product

8.1.6 Bringing in the local industrial design consultant

8.2.1 Problem analysis

8.2.1 Prototype analysis

8.2.1 Marketing

8.2.1 Mass production

8.2.1 Selling

8.2.1 Disposal

8.2.1 State-of-the-art

8.2.1 Identification of need

8.2.1 Conceptualization

8.2.1 Feasibility analysis

8.2.1 Product

8.2.1 Programming

8.2.1 Data collection

8.2.1 Analysis

8.2.1 Synthesis

8.2.1 Development

8.2.1 Communication

8.2.1 Analytical phase

8.2.1 Creative phase

8.2.1 Executive phase

8.2.2 Studying the competition

8.2.2 Familiarising with the client's manufacturing facilities

8.2.2 Learning product performance

8.2.2 Developing idea sketches

8.2.2 Studying the design in three dimensions

8.2.2 Ergonomic assessment

8.2.2 Collaborating with Client's engineering

8.2.2 Producing a prototype model

- 8.2.2 Contacting the consultant industrial designer
- 8.2.3 Pre-design phase
- 8.2.3 Beginning design phase
- 8.2.3 Middle design phase
- 8.2.3 End design phase
- 8.2.3 Post-design phase
- 8.2.3 Divergent activity
- 8.2.3 Motoring activity
- 8.2.3 Convergent activity
- 8.2.3 Re-employing the consultant industrial designer
- 8.3.2 Prediction
- 8.3.3 Diagnosing
- 8.3.3 Determining conclusions
- 8.3.3 Presenting the conclusions
- 8.3.3 Prescribing
- 8.3.4 Producing visualizations
- 8.3.5 Getting consumer reaction
- 8.3.7 Devising methods of achieving the functions
- 8.3.7 Assembling the hardware necessary to support these functions
- 8.4.1 Presenting research and analysis
- 8.4.1 Presenting preliminary sketches
- 8.4.1 Presenting renderings
- 8.4.1 Presenting mock up and prototypes
- 8.4.2 Presenting the design solution to senior executives
- 8.4.3 Planning, preparing, and giving a presentation
- 8.5.1 Evaluation
- 8.5.2 Evaluation or convergence
- 8.5.3 Assessment in terms of decisions of optimization
- 8.5.4 Assessment
- 8.5.5 Decision making
- 8.5.6 Evaluating designs
- 8.5.6 Handling the aesthetic side of design
- 8.5.6 Objective assessment

This may be summarised as:-

1. Designer getting the work
2. Organising the work.
3. Presenting the outcome
4. Doing the work

5. Producing the ideas
6. Company obtaining the designer
7. Marketing
8. Production
9. Examining the present situation
10. Pre-design phase
11. Beginning design phase
12. Middle design phase
13. End design phase
14. Post-design phase
15. Re-employing the designer

12.3.7 The additional analyses of the desk data listed are:-

8.3.2 Mayall, an engineer, finds optically deceiving presentation drawings inexcusable

8.3.4 Dreyfuss uses a full size mirrored half model

8.4.1 Missed out information leading to confusing and exasperating situations

8.4.1 A company person presents the design to the company executive in the designer's presence

8.4.1 The size of the meeting fluctuates during a presentation

8.4.1 The designer contends with human nature, personality clashes, company politics and humorous interludes

8.4.2 Exchanging eye cues during a presentation

This may be summarised as:-

1. Some types of presentation work unacceptable to engineers
2. Designer not given all the information at the right time
3. A company person presents the designer's work
4. Meeting increases in size during a visual assessment
5. There are human factors and politics during a commission and presentation

12.3.8 The sophisticated choosing activities from the desk data are:-

- 8.5.1 Battleaxe
- 8.5.1 T Chart
- 8.5.1 Decision matrix
- 8.5.1 Decision trees
- 8.5.1 Optimisation
- 8.5.2 Checklists
- 8.5.2 Selection criteria
- 8.5.2 Selection criteria
- 8.5.2 Specification writing
- 8.5.2 Quirk's Reliability Index
- 8.5.3 Trade-off decisions
- 8.5.4 Analytical methods
- 8.5.4 Decision matrices
- 8.5.5 General decision matrix
- 8.5.6 Feasibility testing
- 8.5.6 Appeal, where I recognise that this conforms well to those criteria which are generally accepted to be the mark of good
- 8.5.7 Pupilography
- 8.5.7 Electro-oculography
- 8.5.7 Time lapse recordings

This may be summarised as:-

1. Analysing charts
2. Analytical objective ergonomic data.



## 12.4 Formal Academic Listings

### 12.4.1 Courses Taken

1. Colour Science, Instrumental Colour Systems Ltd., Newbury, April 1973 (3 days).
2. Colour Science, Instrumental Colour Systems Ltd., London, October 1972 (1 day).
3. Management for Designers, Middlesex Polytechnic, 1972/73 (47 hours).
4. Design Management, Middlesex Polytechnic, 1972/73 (47 hours).
5. Postgraduate diploma in Engineering Design Methods, Middlesex Polytechnic, 1973 (12 weeks).
6. Acquiring information for Engineering Design, Middlesex Polytechnic, 1973 (12 hours).

### 12.4.2 Seminars Attended

1. Innovation 80 I.E.D. Oxford, April 1972 (3 days).
2. Design as an investment, Company Design Seminar, Nash House, London, October 1971 (1½ days).
3. Design Policy, Practice and Protection, Company & Middlesex Polytechnic Design Seminar, Nash House, London, November 1972 (2 days).
4. Design as a Co-ordinating Discipline, Hornsey College of Art, February 1972 (1 day).

### 12.4.3 Lectures Given

1. Industrial Design of Public Address Equipment, March 1973.  
Sound 73 International Exhibition, Bloomsbury Centre Hotel, London, for the Institution of Public Address Engineers Ltd.
2. Design Policies, July 1973, Company Design Co-ordination meeting, Coburg Hotel, London.
3. Design in the Middlesex Polytechnic, November 1972, Middlesex Polytechnic Design Seminar, Nash House, London.

### 12.4.4 Papers Published

1. Industrial Design of Public Address Equipment,  
p p. 5 - 11, August 1973, Public Address, Institution of  
Public Address Engineers Ltd., London.
2. Industrial Designers - who and what we are,  
p p. 22 - 27, September/October 1973, Engineering  
Designer, IED London.
3. Colour for Engineering Designers,  
p p. 9 - 14, 5 - 1974, Engineering Designer, IED London.

#### 12.4.5 Reports Issued

1. Middlesex Polytechnic, A report on Design in the  
Middlesex Polytechnic 1972/73, Middlesex Polytechnic,  
1973.
2. Design of a control panel for a Marine Survival Radio,  
Project Design Report, Post Graduate Diploma in  
Engineering Design Methods, Middlesex Polytechnic, 1973.

#### 12.4.6 Design Registrations

Two design registrations have been applied for during  
the course of the case studies.

1. On behalf of the client, by Birchall, Baron & Jackson,  
for a type font (USA Pat. Office), Case Study No 13.
2. On behalf of the client, by J Birchall, for a bench  
power supply unit, Case Study No 18.